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PREPARATION FOR THE 1990 FARM BILL

HEARINGS

BEFORE THE

SUBCOMMITTEE ON AGRICULTURAL RESEARCH
AND GENERAL LEGISLATION

OF THE

COMMITTEE ON AGRICULTURE,
NUTRITION, AND FORESTRY
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

FIRST AND SECOND SESSIONS

ON

THE STATE OF AGRICULTURAL RESEARCH AND EXTENSION

JUNE 9, JUNE 20, AND JULY 27, 1989
MARCH 22 AND MARCH 29, 1990

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PREPARATION FOR THE 1990 FARM BILL

State of Agricultural Research

FRIDAY, JUNE 9, 1989

U.S. SENATE, SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION OF THE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m., in room SR-332, Russell Senate Office Building, Hon. Thomas A. Daschle (chairman of the subcommittee) presiding.

Present or submitting a statement: Senators Daschle, Kerrey, and Bond.

Senator DASCHLE. The committee will be in order. I know that several of the members are going to be coming here in just a moment, but I want to start a practice here in this subcommittee that we will carry out throughout the time I am chairman, and that is we are going to start these meetings on time, even ahead of time if the opportunity presents itself.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator DASCHLE. This is the first of a number of hearings that I plan to hold on agricultural research in the coming years. Senator Leahy has indicated a desire to move with the 1990 farm bill, and he hopes to have the noncommodity titles written this year. I intend to start that process today by beginning to assess the state of agricultural research and extension.

It is important that we assess where we are before we consider new legislation. I am aware that over the year there will be a number of proposals for new directions in agricultural research and that most would entail committing new funds. At a time of budget restraint, we need to have assessed our current successes or failures and hopefully correct any deficiencies before we commit to new initiatives.

One thing is certain: that survival of much of the research community depends on a continued commitment to formula funding. In States like my own, competitive grants are really just the icing on the cake. But the formula funds constitute the rest of the cake. Without a cake, there is very little point in having icing. And as we debate some of these competitive grant proposals later in the year, we have to remember this.

As recent anniversaries attest, the Federal research system has served most of very well for a long time. The Hatch Act, which provides funding through the Cooperative State Research Service, celebrated its centennial last year. The Smith-Lever Act, which provides funding for Extension, celebrates 75 years this year. Agricultural research does not always gain that much attention, but it is the cornerstone of this Nation's amazing success in food and fiber production, and comprises a substantial part of the Federal agricultural budget. In this fiscal year, the administration has a combined budget request of $1.2 billion for the Agricultural Research Service, CSRS and the Extension Service.

I hear contrasting views frankly on our ability to get out of the agricultural research community the kinds of information and technology that address today's concerns. The primary purpose of today's hearing is to assess the adequacy and appropriateness of current research.

I might emphasize that I look at the two hearings that we have this week and next, as coupled hearings. Today we are going to be hearing from a number of individuals who can attest to the quality of research from different perspectives, and then on next Tuesday, June 20—I guess it is the following Tuesday—Dr. Charles Hess, the Assistant Secretary of Agriculture for Science and Education; Dr. William Marshall, of Pioneer Hybrid International; Charles Benbrook, the executive director of the Board on Agriculture of the National Research Council; Michael Phillips, the Office of Technology Assessment; and a witness from the General Accounting Office will provide us with a comprehensive look at research from the perspectives that they themselves can offer.

So in addressing research in the next two hearings, we must assess whether the system is able to respond to the priorities society wishes it to address. Some time ago Congress addressed this issue and found that the needed responsiveness was not there because of a lack of coordination.

In 1977 the farm bill enacted by Congress that year was designed, in part, to correct this by establishing a Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board. Now before we write a new farm bill and consider new proposals for increased investment in Federal research, now is the time to review current priority setting procedures. We are seeing the emergence of a great many new issues in agriculture, all of which are vying for research dollars.

Alternative product development, sustainable agricultural methods, ground water contamination, food safety, the alternative energy sources from agricultural products are examples of many of the new items that should be on the research agenda.

With $1.2 billion currently being spent on research, I think there are examples that create cause for concern. USDA's current budget allocation for research on sustainable agricultural techniques is less than $5 million. I know that USDA will point to other research programs and say they make contributions in this area. But when an issue such as this has the kind of a national priority that is so evident, it is clear that the priority setting system at least needs reexamination.

Alternative product development is another example. How much of our Federal research contributes to productivity enhancement as compared to creating additional demand? We have been through sustained periods of overcapacity in U.S. agriculture in recent years, and yet I have detected little change in our research emphasis. It seems to me that we have continued to focus on research that has added to surplus production by increasing productivity when perhaps we should have been focusing a little bit more on demand enhancement through alternative agricultural product development.

Well, these are many questions that I hope to take up in the context of research examination during this hearing today and hearings that we will have throughout the year, especially as I said, on June 20. The two witnesses that we will call to the table first this morning certainly understand research from a perspective that could be very helpful to this committee. Chuck Hassebrook is the director for the Center for Rural Affairs in Walthill, Nebraska; and Dr. Neville Clarke is the director of the Texas Agricultural Experiment Station in College Station, Texas. I would like to ask both witnesses now if they could come to the table.

Gentlemen, we are delighted to have both of you hear this morning. I would tell you, as I know you have heard many times, that the entire text of whatever statement you wish to have printed in the record will be so printed. And if you wish to present your testimony orally or in some more condensed form, you are welcome to do so.

Chuck, let us begin with you.

STATEMENT OF CHUCK HASSEBROOK, CENTER FOR RURAL AFFAIRS, WALTHILL, NE

Mr. HASSEBROOK. Thank you, Senator. I appreciate the opportunity to be here, and I commend you for taking this broad look at the research system and its purposes.

PERSPECTIVE

I would like to begin by talking about the perspective with which we come. The Center for Rural Affairs has been involved for 13 years in onfarm research in northeast Nebraska; working with moderate size family farmers looking for ways to improve their incomes by cutting costs and at the same time be better stewards of soil and water resources.

RESEARCH

We have also worked on research policy. I am looking at the research agenda of the land-grant colleges and the field of biotechnology, and how they might be better directed toward advancing goals such as strengthening the family farm system and enhancing the rural environment. A key point I would like to make is that the highest priority for Congress in the 1990 farm bill needs to be defining the broad goals and purposes that are to be served by the Federal investment in agricultural research.

Those purposes need to include not only goals such as improving efficiency and competitiveness, although those are important, but they also need to include goals such as attaining the structure of agriculture we want, the kind of rural communities we want, and addressing our environmental problems. And Congress should define clear procedures to ensure that those congressional priorities and social goals are, in fact, truly incorporated in the research priority setting process at the ARS and at the land-grant experiment station level.

GOALS AND PURPOSES OF PUBLIC AGRICULTURAL RESEARCH

I would like to set forth four goals that I think would be appropriate for Congress to include in its purposes for the agricultural research program.

The first goal is to have agricultural research programs that strive to maximize the number of opportunities for people to be self-employed in agriculture and support a social and economic structure in rural America that is free of great inequality. Now sometimes when I say that people accuse me of being emotional. But I think this is much more than a matter of emotion and preference. It is a matter of healthy communities. There is a wide body of research which establishes that a dispersed system of agriculture with owner operated farms and moderate scale farms simply produces healthier communities, both socially and economically, and I think that is very important.

Second, we need to undertake research to develop farming systems that enhance human health. There has been much concern recently over the case of Alar and apples, but one of the biggest health problems we need to be concerned about in agriculture and agricultural research is the health of farmers.

There is a wide body of epidemiological studies which show that farmers and people who live in farm communities have very elevated rates of various types of cancer, broad types of cancer, and particularly leukemias. In fact, there was a study recently in Kansas which showed that people who use pesticides more than 20 days a year have six times the rate of non-Hodgkins lymphomas as does the general population. I think we should be concerned about that.

And our ag research system should be concerned when we have farming systems that threaten the health of farmers.

Third, we need to have farming systems that enable people to farm profitably as they do a better job of protecting the environment. In many rural States we are seeing 20 to 25 percent of the wells contaminated by farm chemicals.

That is just not acceptable. We see about 20 percent of the Nation's farmland having soil erosion that threatens its long-term productivity. In other words, we are losing soil faster than new soil is formed. And frankly, we just cannot do that if we want to feed future generations. I think it is not wise and it is probably immoral to deplete a resource base in ways that threaten the food supply for future generations.

And we need to get serious about developing farming systems less dependent on petroleum and petro chemicals because frankly we are running out.

Fourth and finally, we need to accomplish those broader goals, at the same time as we continue to strive to develop a system of agriculture that is more efficient and maintains our competitiveness in the world.

Now, can the research system come forth with farming practices that achieve all those goals simultaneously? I think it can, but I do not think it will unless we make some fundamental changes in the way that decisions are made about what research we do and also unless we make some basic changes in our approach to agriculture and technology.

INDUSTRIAL VERSUS SUSTAINABLE SYSTEMS

We need to focus on refining farming systems that enhance the role of people in agriculture. Traditionally we have tried to make farming more efficient by reducing the role of people. Instead, we need to find ways for farmers, people, to apply their skills, their management and time, to make their farm more efficient and more profitable by reducing the amount of money spent on inputs and levels of capital investment.

Those types of systems, it seems to me, could both increase income and be good socially because they require more people and they also support more people by providing them with income. And I think they tend to be biased toward family types of farms, owner operated farms, because those systems require the kind of intensive hands-on management in the barn and in the field that an owner operator is best suited to provide and that you are less likely to get from a relatively unskilled and low paid employee.

EXAMPLES OF THE TYPE OF RESEARCH THAT I THINK WOULD MAKE US MORE EFFICIENT AND BE GOOD FOR BOTH THE ENVIRONMENT AND FOR OPPORTUNITY IN AGRICULTURE

Let me give you a couple of examples of the type of research that I think would make us more efficient and be good for both the environment and for opportunity in agriculture. We hear a lot of talk about developing herbicide resistant crops to make herbicide weed control more efficient.

I would like to see some research to develop a more cold tolerant corn variety that would germinate and emerge faster in the spring. If I had a corn plant that would get up to 6 inches tall in half the time of what current varieties take, I could get as good of weed control with a rotary hoe and a cultivator as anyone can get with chemicals now, and I could do it cheaper.

That kind of research would be good for family farms because it provides an opportunity for the farmer to use his or her time and management to replace an input and improve his/her income that way instead of always looking to find ways for farms to get bigger and fewer as a way to increase income.

A second area we need to look at is more research on agroecology. By that I mean the study of how the various living organisms interact in agricultural ecosystems, and how they are influenced by environmental factors and farming practices, so that we can gain the understanding that will enable farmers to better use their management, to adjust their farming practices so they do not get the pests in the first place, and of course are not dependent on inputs to control them.

LEGISLATIVE RECOMMENDATIONS

Well, what does Congress have to do to make these types of research happen? As I said in the beginning, I think the first, and the most important thing, is that Congress needs to very clearly articulate the broad goals and purposes that it hopes to achieve with its investment in agricultural research, and I think it needs to include the kinds of goals I talked about earlier. Those goals and purposes should apply both to competitive grants and to formula funds.

Second, Congress needs to define procedures to ensure and direct that those goals of Congress are, in fact, reflected in the research priority setting process. One thing—it is certainly not enough—but one thing we could do is require an annual report of each Agricultural Experiment Station, of the ARS, of the Joint Council and Users Advisory Board on how they are incorporating these goals and purposes in their research priority setting process.

NEW SPENDING

With respect to competitive grants, I think that we need to directly incorporate these goals and purposes in the calls for proposals and in criteria for judging proposals. That is especially important if we see the kind of increases in funding for competitive grants that Neville will probably talk about and that many people are proposing.

I have some thoughts about how you might do that. If we have an increase in competitive grants, a good part of that money needs to go for technology assessment research so we can start to define what types and areas of research, what research programs will, in fact, help us reach the goals that we set for agricultural research. Then, when we issue a call for proposals we can say that we place a particular priority on research in a given area like agroecology. The criteria could then weigh agroecology proposals higher because we believe they advance our broad social and environmental goals. That also needs to include a bigger commitment to low-input sustainable agricultural research, as you mentioned, because that type of research does advance those broader social goals.

And by the way, I commend you and the other members of the committee who have consistently urged the Appropriations Committee to put more money in that.

NEW USES AND NEW CROPS RESEARCH

Finally, I would like to talk about research to develop new uses for farm commodities. Congress needs to carefully direct that research, too. I think we need a priority on rotation crops; crops like alfalfa and oats that we could add to rotations with corn so that we do not have pest problems. If we put all of our money into developing new uses for corn, we will only have markets for that, and it will be profitable only to grow corn. We need to make it profitable to grow oats and alfalfa so farmers can afford to rotate crops.

For new crops, we need production systems that fit family size farms, and I think when we look at processing technologies we need to look at technologies of a moderate scale that would work on farms and in rural communities and not simply in a few urban centers.

CONCLUSION

In conclusion, I think the most important challenge for Congress this year is to define those broad purposes and goals for the ag research program. The research community needs to accept the responsibility to direct their research programs in ways that fit broad goals for agriculture defined democratically. If we fail to do that, the research system risks public support both for itself, for the land-grant system, and also for technology in general.

If people are forced to choose or forced to accept either no research and no technology or technology which has results which are neither desirable nor necessary, they may begin to reject technology itself and the research system, and I think we need to avoid that. Thank you.

Senator **Daschle**. Chuck, thank you. Dr. Clarke.

[The prepared statement of Mr. Hassebrook follows:]

TESTIMONY OF CHUCK HASSEBROOK
OF THE CENTER FOR RURAL AFFAIRS; WALTHILL, NEBRASKA
TO THE
AGRICULTURAL RESEARCH AND GENERAL LEGISLATION SUBCOMMITTEE
OF THE U.S. SENATE AGRICULTURE COMMITTEE

JUNE 9, 1989

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to speak before you today. I commend you for convening this discussion. Agricultural research is a powerful force in shaping agriculture and rural life and too little attention is given to its broad implications. The central theme of my testimony is that the purposes and goals of the public investment in agricultural research must be clearly articulated by Congress and research directed toward advancing them. Those goals and purposes should include increasing the number of opportunities for people to own and operate farms, enhancing rural community vitality, protecting our soil and water resources and improving human health, as we advance broader economic goals of improving efficiency and maintaining competitiveness.

My perspective reflects the experience of the Center for Rural Affairs over 13 years in on-farm research to enable moderate sized family farmers to explore innovations aimed at reducing input costs and improving profits, as well as protecting and conserving natural resources. We have also been researchers of research policy. In 1985, we published the report Path Not Taken, on the impact of private grants in leveraging publicly funded research at the University of Nebraska. In 1988 we published Choices for the Heartland: Alternative Directions in Biotechnology and Implications for Family Farming, Rural Communities and the Environment. The report provides a comprehensive overview of biotechnology research that will affect agriculture in the nation's heartland and analyzes its impact on the people living there. It sets forth an alternative research agenda in biotechnology and traditional research methods to enhance family farming, rural communities and the environment. The report discusses the implication of biotechnology for the land grant system and proposes policy changes to direct agricultural research to the improvement of rural life.

Agricultural Research as Social Planning

Agriculture research is, in a sense, a form of social planning. Choices made by Congress, research institutions and researchers about what research is undertaken in part determine what farming systems, varieties and technologies are developed, become costs effective and are put to use. These technologies, in turn, profoundly shape our economic and social structures, the natural environment and human health. If we are to achieve the kind of society we want, these decisions must be made with consideration of broad social and environmental goals. If we are to be a truly democratic society, the public must gain control of these decisions.

Unfortunately, many land grant research programs are not guided by any broad set of public purposes, leaving a void to be filled by private companies with product development interests. For example, land grant institutions have been scrambling to develop research programs in biotechnology, but few have defined agronomic or social goals for such research. (Buttel, 1986) In the absence of clear public purposes, private parties often leverage public research funds and the time of public sector agriculture researchers to advance their private interests through grants; and consulting arrangements with, equity interest in and employment by biotechnology companies. (Buttel, 1986) Many land grants now view royalties from patents and fees as a source of income to support research (Burkhardt, et. al., 1987), creating pressure to direct agricultural research toward development of products to sell to farmers. What may be lost in the shuffle is research which helps farmers cut inputs costs and consequently offers little profit potential to agribusiness corporations. (Buttel, 1986) As for consideration of the structure of agriculture in setting research priorities, the University of California and National Association of State Universities and Land Grant Colleges recently argued in court that land grant experiment stations have no obligation under federal law to consider impacts on small family farms in setting their research agenda and a California appellate court last week agreed. (Court of Appeal of the State of California, First Appellate District, Division Five; 1989)

Goals and Purposes of Public Agricultural Research

The establishment of priorities for public sector research plays too large a role in shaping society to be left to individual scientists and product development interests. If agricultural research is to advance broad public purposes, Congress must take the lead by articulating the appropriate goals and purposes. I propose that those goals and purposes include the following:

- Maximize the number of opportunities for self employment in agriculture and rural communities and enhance an economic and social structure free of great inequality. A substantial body of sociological research indicates that a dispersed farm structure with many owner operated farms creates healthier communities than a large farm structure. University of California researchers have summarized these findings as follows:

> As farm size and absentee ownership increase, social conditions in the local community deteriorate. We have found depressed median family incomes, high levels of poverty, low education levels, social and economic inequality between ethnic groups, etc., associated with land and capital concentration in agriculture. . . . Communities that are surrounded by farms that are larger than can be operated by a family unit have a bi-modal income distribution with a few wealthy elites, a majority of poor laborers, and virtually no middle class. The absence of a middle class at the community level has a serious negative effect on both the quality and

quantity of social and commercial services, public education, local governments, etc. (MacCannell, 1983)

- Prevent environmental contamination and resource depletion. Over one hundred and seventy million acres of U.S. farmland are eroding faster than new soil is formed, threatening long term food production potential. (USDA, 1987) (This data predates implementation of the Conservation Reserve Program and consequently may be over stated by 25 to 30 million acres.) In many farm states 20 to 30 percent of all rural wells have nitrate concentrations in excess of established standards, largely from chemical fertilizers. To date, the Environmental Protection Agency has found 74 different pesticides in the ground water of 38 states including Nebraska (EPA, Dec. 1988 - Based on the agency's Pesticides in Ground Water Data Base).

- Enhance human health. While much attention has been focused recently on issues of food safety, growing evidence of the impact of modern farming practice on the health of farmers has received relatively little attention. Numerous epidemiological studies have shown a strong correlation between various types of cancer, especially leukemias, and farming or living in agricultural areas. (Strange, Krupicka and Looker, 1984) Studies by the National Cancer Institute and the University of Kansas indicate that farmers who are exposed to herbicides for more than 20 days each year are six times more likely than non-farmers to develop cancerous tumors known as non Hodgkins lymphomas. (The Furrow, 1988)

- Enhance efficiency and maintain our competitiveness, as we address social and environmental concerns.

Can the nation's public agricultural research system advance each of these goals simultaneously? I believe that it can do so, but it will not, unless we fundamentally change both current directions in agricultural research and the ways in which research priorities are established.

Industrial Versus Sustainable Systems

Much of the current public research program pursues an industrial approach to agriculture, which is inimical to rural social well being and environmental quality. These systems seek efficiency through reducing the role of people in agriculture, both quantitatively and quality, to make it possible for fewer people to farm the nation's land and produce its food and fiber. They seek to reduce the amount and sophistication of labor involved in farming to make it possible to more completely separate labor from management and the exercise of judgement to facilitate provision of farm labor by unskilled and low paid employees. These systems use technology, such as chemical and biological products, to over ride the pest and nutrient constraints on monocrop systems, such as continuous corn. While research may yield new and safer products to over come these constraints, industrial systems will remain on a treadmill on which new products will continue to be needed to respond to the development of resistance by pests and the resistance of natural systems to monocropping and biological uniformity. And for the forseeable future, these products will continue to present health and/or environmental risks.

By contrast, if we want agriculture research to advance each of the goals set forth above I believe it can do so, but only if we take a fundamentally different approach to agriculture and technology. I call this approach sustainable family farm agriculture and stress that in many respects it is more sophisticated and more knowledge and management intensive than industrial systems.

Sustainable systems seek efficiency by enhancing the role of people in agriculture and making it possible to reduce capital expenditures and input use through more intensive application of skilled labor and hands on management. Whereas industrial systems seek to reduce costs by replacing two dollars worth of time with one dollar worth of inputs, sustainable family farm systems seek to improve efficiency by replacing two dollars worth of inputs with one dollar worth of time. Because these systems rely on sophisticated and highly motivated labor able to exercise judgement in the field and barn, they are well suited to an owner operator structure. These systems require a better understanding of natural systems to enable farmers to adjust their management practices to work in concert with nature, to avoid problems and reduce the need for inputs. They typically involve practices such as crop rotation and cover crops to meet nutrient needs, reduce pest problems and conserve soil.

Several examples illustrate the alternative research approaches appropriate to these two systems. In the area of weed control, no focus of research has recently received more attention and more research dollars than the development of herbicide resistant crop varieties. Such varieties would allow farmers to use a greater number of herbicides to provide more complete weed control chemically, and thereby eliminate the need for mechanical cultivation, allowing one person to farm more acres. This is exemplar of the industrial approach. By contrast, a sustainable agriculture research focus would be the development of more cold tolerant crop varieties, which germinate and emerge faster in cool Spring temperatures to get ahead of weeds and allow for more effective weed control without chemicals through light tillage, such as rotary hoeing and row cultivation. The former seeks to reduce costs by reducing the role of the farmer. The latter seeks efficiency by enhancing the role of the farmer to reduce purchased input use.

In the area of insect and disease control, industrial systems are supported by research to create new products for farmers to buy to control the pests that plague monocrop systems, such as corn rootworm, grey leaf spot and head smut in continuous corn (corn produced on the same land year after year). By contrast, sustainable agriculture would be supported by research in the field of agroecology, aimed at developing an understanding of the interactions between living organisms, environmental conditions and farming practices in agricultural ecosystems. Such research would provide the knowledge base for farmers to use their skills and management to alter practices and farm in concert with nature, to avoid pest epidemics. Plant breeding efforts supportive of sustainable agriculture would focus on developing resistance to those pests which are not adequately controlled by economically acceptable changes in farming practices. Researchers would develop new uses for the lower revenue crops included in sustainable rotations, such as oats and alfalfa.

In livestock production, millions of dollars of public funds have been spent to refine industrialized total confinement production systems for hogs and other livestock, and to address diseases and other problems which occur in these systems. By their very nature, total confinement systems move meat and milk production off of moderate sized owner operated farms. The high investment costs preclude small scale application and the routinization of labor and management tasks in these systems is conducive to employee operation. By contrast, a sustainable family farm research agenda in livestock production would focus on development of lower investment livestock production systems which reduce capital barriers to small and beginning farmers and allow them to earn a return on their skilled labor and the intensive hands on management that such systems require. Disease and breeding research would focus on overcoming the stresses in such systems, including parasites and temperature variation. Researchers would seek to improve the nutritional content of the crops grown on diversified farms to reduce the need for feed supplement purchases. This would reduce the significance of the economic disadvantage smaller farms face in buying feed inputs. Small hog producers pay much more for their feed supplements than larger producers. (Van Arsdall and Nelson, 1985)

Legislative Recommendations

I recommend that you set as your first priority for the research title of the 1990 farm bill, articulation of the goals and purposes of the federal investment in agriculture research, including formula funds, competitive grants and all other federal agricultural research funds. I propose that those goals and purposes include those presented earlier in this testimony for the structure of agriculture, human health and environment. In addition, I recommend that you define procedures to ensure that these goals and purposes are reflected in the research priority setting process. That should include requiring an annual report of the Agriculture Research Service and each land grant experiment station describing its efforts to incorporate these goals in its research priority setting process. In addition, I propose that the the USDA Joint Council and Extension Users Advisory Board report annually on how they have incorporated these goals in their plans and recommendations.

With respect to competitive grants for agricultural research, I recommend that Congress direct the administering bodies, including USDA and the National Science Foundation, to incorporate these goals both in their calls for proposals and criteria for evaluating proposals. That may require giving them the authority to spend a portion of their funds on research to assess likely impacts of alternative research directions. The result might be calls for proposals that list areas of research deemed to be especially appropriate, and criteria that reward research in such areas. For example, a call for proposals might prioritize basic research in agroecology or research aimed at gaining a basic understanding of specific pests for which no economically viable low input solutions exist and the genetic basis for resistance to them.

New Spending

Any new funds for agricultural research should be likewise targeted, included the Board on Agriculture proposal to increase appropriations for competitive grants for agricultural research by $500 million per year. If such an increase is authorized, I recommend that:

- A substantial portion of the increase be committed to the Low Input Sustainable Agriculture Research Program (LISA). The program has a strong track record, but as a member of the North Central Region Technical Committee which reviews proposals for the program, I have found it to be grossly underfunded relative to the cost of quality proposals submitted. I commend the many Agriculture Committee members who have repeatedly expressed to the Appropriations Committee their support for full funding of this program.

- Any increased funding for basic research include a strong agroecology component. As says Texas A and M University Plant Pathologist J.A. Browning, "There is a great dearth of research from an "agroecosystem approach", which would enable farmers to choose, from among the many interacting cropping systems and farming practices, those that work together to produce the desired result." (Browning, 1985)

- Any increased funding for genetics research prioritize development of crop varieties and livestock of potential value in addressing pests and other constraints which cannot be controlled at an acceptable economic cost, by changes in farming practices.

- Authorizations for new funds include money for research on farming in the face of potential climate change. While predictions of reduced rainfall from climate change are uncertain, it would be wise to step up research efforts to prepare us for the possibility, including breeding more drought tolerant plants; development of management systems to maximize populations of beneficial mycorrhizae fungi, which help plants better utilize soil moisture; and development of management practices to reduce evaporation and increase water absorption including rotations, tillage systems, field windbreaks, organic matter management and cover crops.

- The calls for proposals and evaluation criteria reflect congressional goals and purposes for agricultural research, as discussed above.

- A portion of new research funds be allocated to research to assess the social and environmental impacts of alternative research directions.

- A portion of such funds be allocated to competitive grants for innovative extension programs to reach small and moderate sized farmers, including potential beginning farmers, and minority farmers who might otherwise be left behind by rapidly changing technology. We are entering the era of information intensive agriculture, as we make greater use of biotechnology and low input sustainable systems. Whereas in recent years those who lacked capital were left behind, in coming years those who lack information will be left behind. (Harshbarger, 1987) If society wants to protect a base of small farm operators, it may be necessary to undertake a major extension effort to develop their management capabilities. (Kliebenstein and Shin, 1987) The content of the program should include a major focus on low input and low investment systems appropriate to farmers with limited capital. The program would include procedures for identifying research needs of participating farmers and feeding those into the land grant research priority setting process.

- A portions of such funds be allocated to competitive grants for innovative programs to engage the public in the debate over the future of the food and agricultural system and involve the public in setting agricultural research priorities.

New Uses and New Crops Research

I recommend that any authorization of new funds for research to find new uses for existing crops and to develop new farm crops with market potential give priority to the following:

- Research which develops new crops and new uses for existing crops which, when added to rotations, reduce soil erosion and use of petro chemicals and other purchased inputs.

- Development of production systems suitable to small and moderate sized family farms for new crops and development of new uses for existing crops grown principally on such farms. For example, USDA'S efforts to develop aquaculture should focus on low investment systems which work on family sized farms. Research to find new uses for farm commodities should prioritize crops which are predominantly grown on small and moderate sized family farms.

- Development of modest scale processing techniques appropriate to location on farms and in small rural communities and development of new crops suitable to small scale processing, to support rural development.

Finally, such authorization should provide for representation of sustainable agriculture groups on any appointed body controlling or advising the use of such funds.

Water Quality Research and Extension Efforts

I recommend that the Agriculture Committee direct that USDA and EPA research and extension efforts on water quality include a strong sustainable agriculture component. That might include research to evaluate the effectiveness of low input sustainable agriculture approaches in addressing water contamination while allowing profitable farming and special demonstration and educational programs on low input sustainable agriculture in areas with water contamination problems. It might also include the development of best management practices for manure and legume sources of crop nutrients.

Conclusion

If the public agricultural research system is to yield a desirable structure of agriculture, vital rural communities and environmental and human health, Congress must clearly articulate these as the public purposes the system is to serve. Those who serve in the system must accept the responsibility of directing their research toward the advancement of public purposes democratically defined.

To fail these challenges, risks continued erosion of public support for the land grant system and science. People forced to choose between a research system and technologies which produce results that are neither necessary or desirable, will reject the system and technology itself. We must instead gain public control of research and technology to direct them toward advancement of social well being and service of broad public purposes.

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STATEMENT OF NEVILLE P. CLARKE, DIRECTOR, TEXAS AGRICULTURAL EXPERIMENT STATION, COLLEGE STATION, TX

Dr. **Clarke**. Thank you, Mr. Chairman.

In the next few minutes, I would like to try to summarize a fairly long written submission that I have put before the committee.

BACKGROUND

I would start out by telling you that I, in addition to being Director of the Agricultural Experiment Station in Texas, I am appointed in the land-grant system to a couple of committees that are central to the planning activities.

I represent the State Agricultural Experiment Stations as chairman of their planning subcommittee, which develops a long-range strategic plan for agriculture and I might say we are in the process of a major revision of that plan this summer. The kind of input that we are receiving here would certainly be useful to us in considering the broad range of inputs that will come to us for that revision.

Along with Administrator of ARS, Dr. Dean Plowman, I also am cochair of the National Agricultural Research Committee, which is a part of the Joint Council on Food and Agriculture. This present month I have rotated off of the Joint Council on Food and Agriculture, but will continue to be an adjunct member there. So I am involved in the planning process and hope to be able to summarize some of the aspects of that that I believe will be germane to what we are talking about.

INTRODUCTION

It is my intent to deal with the process of planning as well as the substance of the planning process to try to provide a context for where we are with the ability to deal with changing issues and to show how those changing issues are accommodated within the entire system.

I will focus my comments on the State Agricultural Experiment Stations since that is where my primary experience lies. In the testimony that I have given in writing, I suggested that we might review user inputs; look at inputs from researchers; research planning at the regional and national level; look at the impact that we have had in recent years on research funding; and assessment of whether the system is meeting its planning goals. Then I will address a few issues that I was asked by your staff to do, in looking forward to changes that could be considered for the next generation of the farm bill.

GEOGRAPHIC DIVERSITY

I do not have to tell this committee, but I do want to just set the context for U.S. agriculture by saying that its most interesting and challenging characteristic, if one looks at it in the aggregate, is geographic diversity.

That geographic diversity has driven the system to develop the State Agricultural Experiment Stations that can address the kind of technology that is applied locally at individual States and in parts of States to address the continuing needs of agriculture.

This generates an enormously complex agriculture and that makes for a very challenging set of issues if one is looking at the total spectrum of needs for agricultural research across that system.

MULTIPLE RESEARCH PLAYERS

There are certainly multiple research players that people such as yourselves are concerned with in terms of assuring that we have things put together the right way and are making the best use of a complicated set of resources and a complicated set of agencies that are involved in agricultural research.

NETWORKING AND COMMUNICATION

A relatively large part of that funding comes from the Federal system, but also individual States because of this diversity of agriculture have also invested substantially in agricultural research for an agenda that is essentially oriented to the State's individual needs.

DIVERSITY OF USER COMMUNITIES

We have a tremendous diversity of user communities. We hear from Chuck this morning about a rather broad user community and certainly a growing user community that has a set of needs that fit, I believe, very comfortably, into a broader context of agricultural needs and resulting research. But the needs are substantially broader than that of the sustainable agricultural rural community concerns that Chuck has highlighted for us this morning.

THE NEW BIOLOGY

In the process of doing total planning for the total system, one has to look at a number of very interesting intersections of current issues as well as ongoing issues. I place the sustainable agriculture rural community issue solidly in the middle of those sets of important issues that need to be concerned. We stand at an intersection in agriculture today where environmental concerns very broadly stated, where the concerns of the consumer about the safety and healthfulness of food, where the concern about international competitiveness in agriculture to maintain a viable industry in this country, all come together with a series of issues which you have referred to in your comments and Chuck has as well.

And in addition, come to an intersection where the opportunities in science, the opportunities in biology, engineering, and other areas have never been greater than they are today. The opportunity to solve and address some of these issues in a very broad and pervasive way is one of the most exciting elements of agricultural research today.

TECHNOLOGY TREADMILL

In my prepared statement I refer to the technology treadmill that I believe agriculture as well as other industries find themselves on today. I mean by that that we are now beginning to compete in the international marketplace with countries that are quite capable of developing technology as rapidly or perhaps more rapidly than we are and have the ability to very effectively compete with us in the international marketplace, and the technology that is developed today cannot be expected to last forever.

New technology will have to replace old technology. We have introduced into our planning activities the concept of "maintenance research," for instance, where if you have bred natural resistance to a set of diseases or perhaps insect resistance, in a matter of time there will be genetic adaptation of those pests to the varieties that have been developed, and that process has to be redone again and again to maintain the capability of existing technology to do what it already does.

INPUTS FROM AGRICULTURAL RESEARCH USERS

So that introduces another dimension of complexity into the total planning process. We have a substantial variability in the expectations of people who use the products of agriculture and a growing interest in the involvement of those individuals in the planning process and in the process of evaluating the products of research.

It is our belief and contention that the 1977 farm bill that created the several committees that you referred to has served us well. We believe that the Joint Council and the Users Advisory Board process is working. We see it beginning to work quite a bit better in the last half of the 1980's than it did in the first half of the 1980's.

But we hope we are beginning to address a series of issues that are important. To talk a little about the involvement of our customers, of our clientele in the planning process, I can perhaps do it best by going back to a specific example in my own State. We have a strategic planning process that begins at the county level that involves literally thousands of farmers, small and large, with an opportunity for inputs.

We deal with more than 40 commodity organizations and natural resource groups in our State. We have a set of about 40 committees that engage those groups and develop from them a sense of what is needed and I come back again to the site specificity of agriculture to say that in my view the most effective place for that input to occur is at the grassroots level. I believe that researchers at the grassroot level as well as those who are interested in the agenda need to interact very early on at the local level and that we need to bring up a grassroots consensus that incorporates the inputs that we get at that level of interaction, as we bring the new and changing agendas for agricultural research forward.

We do that in our own State. We do that in most of the other States in one form or another and then we come to regional planning across the four regions of the United States. And then the committee that I am working on and the Experiment Station's Committee on Organization and Policy that brings the strategic planning to the national level, basically aggregates very large quantity of input from the individual States, represents a consensus of individual experiment station directors, and indirectly then their constituents that I have referred to that are involved in the grassroots planning process, and evolve out of that a set of very broadly stated initiatives which are represented in the document that I provided for you ahead of time.

RESEARCH INITIATIVES

That process basically is sort of illustrative of the complexity of agriculture in the United States and the complexity of the research planning process. We have a 1989 document that presents about 21 areas of new initiative, many of which are quite complementary to the things, I believe, that Chuck has identified that we believe are important enough to bring forward as things that need to be addressed either with new funds or with redirected funds.

It is interesting to look at the first five or six of those, about the first 25 percent of them, and look at how the various regions feel about those, and it is very clear that if you take the top 25 percent that all four regions in the country will agree that those are the top priority issues in a list of 21 issues.

If you go to the bottom of our list, there is also a very substantial agreement about what is least important among those initiatives, and if you look in the middle, you see quite a bit of smear between the four regions which we contend represents the very healthy differences that exist in the regionality of agriculture across the United States.

The important thing, I believe, is that it is possible to agree on a few things that are pervasive and overriding and of substantial importance, and I believe we are talking about those issues as we talk about some of the things that have already been said this morning.

BASE PROGRAM

We have another concept that I would like to introduce into this discussion, and that is the concept of what we call the base program. It is our contention that with the diversity of agriculture in the United States, which is site specific, that there is a regionality that is one dimension of the base program. The second dimension is the increasingly large number of disciplines of science that have to be brought to bear to deal with problems. And the third dimension has to with the individual commodities or the natural resource areas that are of concern.

That three dimensional matrix needs to be kept robust and healthy. It needs to be dynamic. It needs to change in response to changing requirements, but it must be ongoing to cover all the bases of agriculture in the individual States and across the Nation. And it is from that set of base program activities that we believe must be continued to support all of agriculture that the relatively small number of new initiatives come forward and can be identified as areas of new endeavor that need to be addressed.

If we are evaluating what we have been talking about, first of all, I think the thing I can offer to you is a product of the planning process is illustrated by this document and by the several tables that I have given you in the back of the testimony. And we are, I believe, doing a reasonable job of addressing the broad array of interest that need to be addressed in agriculture.

I believe we do a better job of dealing with production agriculture than we do some of the other aspects of agriculture that could be dealt with, and while I say we do a good job, I certainly do not lay that out as an adequate job.

I think there are a number of things that need to be addressed more vigorously in the planning process in the decade of the 1990's and we are hopeful that our planning process that we will undertake this summer in the experiment station community will be a good step in that direction.

We believe that the consensus that is beginning to emerge out of this area is a healthy one. We believe that it is beginning to identify the kinds of issues that Chuck has talked about. I do not believe that we would say that we have specifically focused in to the extent that perhaps Chuck would have us do on sustainable agriculture in terms of an overriding issue, but we see that as having a definitive place in the total agenda and a place that needs to have an increasing awareness and involvement.

SUSTAINABLE AGRICULTURE

You mentioned in your comments earlier this morning, Mr. Chairman, that the State Agricultural Experiment Stations identify other investments than the small dollars that are explicitly labeled for sustainable agriculture as being applicable to this arena, and I strongly subscribe to the fact that that is the case and further than that kind of activity is not new in the agenda of the State Agricultural Experiment Stations. I am prepared to cite a number of specific examples as might be appropriate to show that the general tenants of the sustainable agriculture interest began, in fact, a number of years ago, certainly back as far as the early 1970's. I would indicate that the integrated pest management activity that has essentially reduced the use of pesticides, reduced the cost of programs, and the like, is certainly a major forerunner of some of the things that are emerging in the areas of interest in sustainable agriculture.

Biotechnology has been a major factor in the research agenda in the decade of the 1980's. In reading the background papers that Chuck Hassebrook has provided, I find much agreement between what he says and what the community that I represent says about the use of biotechnology and about some of the concerns of the use of biotechnology. Biotechnology probably is a good indication of our ability to redirect our resources within existing programs.

We have, in fact, over the period of recent years, for instance, taken the number of full time equivalent scientists' years from about 292 to about 490 within the program, and taken them from existing programs and redirected them into the area of biotechnology.

There has been a substantial investment at the State level in a number of States in this existing new area of biology that is going to, we believe, carry us a good ways along toward the several major goals that we have talked about this morning, enhancing competitiveness, reducing the use of harmful chemicals, better ways of driving the food safety issue and the like. The biotechnology agenda is having a very broad impact on research and the planning process is accommodating that in the context of the several objectives that are being talked about.

We are somewhat concerned that those of us in the research and development community may tend to give you an expectation that is greater than what can actually be accomplished in the short-run as a result of biotechnology.

Some of the goals that we talk about, we believe are achievable but in some cases I have personal concern that we create the feeling that that is just around the corner, and there are going to be some existing inputs from biotechnology soon, but some of the harder ones are going to take time.

FARM BILL POSSIBILITIES

In looking at the farm bill and the possibilities that might come there, I would suggest that we, our community are doing a number of studies that are designed to provide input to the Congress on the farm bill, and we hope that we will have an opportunity to make those inputs to you as they are finished in the summer and fall of this year.

We believe there may be a need to give some consideration to the level of authorization for research as the farm bill is restructured. That we may need to do a better job of looking at the methods that we are presently using for, asking for facilities and equipment for research in agriculture.

We certainly, I think, would agree with Chuck that we need to have better methods of interacting with the Congress with the special needs that are being talked about today, and we certainly, as we look down the road, hope that the Congress will be favorably inclined toward recognizing that we still have a demonstrated underinvestment in agricultural research relative to the payoff and to the needs that we deal with.

Mr. Chairman, those are the comments that I would make, and I thank you for the chance to do so.

[The prepared statement and attachments 1-3 of Dr. Clarke and the report, Research Initiatives—An Update of the Research Agenda for the State Agricultural Experiment Stations, January 1989 follow:]

TESTIMONY

FOR

THE SENATE AGRICULTURE COMMITTEE

THE RESEARCH AGENDA FOR U.S. AGRICULTURE
AN EVALUATION OF THE PLANNING PROCESS AND ITS RESULTS

BY

NEVILLE P. CLARKE

DIRECTOR, TEXAS AGRICULTURAL EXPERIMENT STATION

CHAIRMAN OF THE SUBCOMMITTEE ON PLANNING AND BUDGET
EXPERIMENT STATION COMMITTEE ON ORGANIZATION AND POLICY

CO-CHAIRMAN OF THE NATIONAL AGRICULTURAL RESEARCH COMMITTEE
JOINT COUNCIL ON FOOD AND AGRICULTURE

JUNE 9, 1989

Mr. Chairman, my name is Neville P. Clarke and I am Director of The Texas Agricultural Experiment Station, a part of The Texas A&M University System. I also serve as chairman of the Subcommittee on Planning and Budget of the Experiment Station Committee on Organization and Policy; and as co-chairman of the National Agricultural Research Committee, which is part of the Joint Council on Food and Agriculture. The community that I represent appreciates the opportunity to present this testimony to your Committee.

INTRODUCTION

In this testimony, we will address several elements that are vital to the process for agricultural research:

1. Inputs from the users of research and planning at the state level.
2. Inputs from researchers.
3. Research planning at the regional and national level.
4. Impact of planning on research funding.
5. Assessment of whether the system is meeting its planning goals.

COMPLEXITY OF AGRICULTURE IN THE UNITED STATES AND ITS IMPACT ON AGRICULTURAL RESEARCH

Geographic Diversity

The geographic diversity of our country, variations in markets and natural resources, cultural interests of the citizenry, and other factors have created a highly diversified U.S. agricultural industry. U.S. agriculture is substantially site-specific in research information and technology needs. This diversity was recognized more than 100 years ago, when the Hatch Act was passed by the Congress establishing a partnership between federal and state government. This act led to the establishment of the State Agricultural Experiment Stations.

Multiple Research Players

The Agricultural Research Service, U.S. Forest Service, Economic Research Service, and numerous other governmental research laboratories outside of the USDA are involved in agricultural research. Also, many academic institutions outside of the land-grant universities are actively involved in research that contributes to agriculture and its related industries. Food and agriculture industries conduct a large volume of directed research.

Networking and Communication

The diversity of institutional and regional research in agriculture is almost as great as agriculture and its related industries in the United States. It has been and continues to be challenging to establish appropriate networks and methods of coordinating research to ensure that diversified needs are met for site-specific research. At the same time, unnecessary duplication must be avoided or minimized and the research community must plan and execute research that is cooperatively conducted. Also, it is critical that the research agenda address the diverse needs of the constituent users of its products. We believe that the Joint Council on Food and Agriculture, which was mandated by the Congress in the 1977 Farm Bill, as well as succeeding farm bills, has accomplished much to meet this planning need. We shall address this function more as this testimony proceeds.

Diverse User Communities

Agricultural and related life sciences and social sciences research often must address needs of seemingly divergent users. New technology for one commodity has spillover effects (sometimes negative) in other commodities, and regional gains in one area can create negative economic reactions in another. Highly intensified agriculture can have negative environmental consequences. In the absence of expanding (international) markets, new technology and knowledge that enhance yields can intensify the problem of domestic surpluses. Some elements of technology development are believed to accelerate the changing structure of agriculture in the U.S. toward larger, more integrated operations that have the capital and know-how to be early adopters of new knowledge and technology.

The New Biology

The opportunities to make fundamental breakthroughs in the sciences basic to agriculture have never been greater than they are today. For example, inherently pest-resistant plants can reduce or eliminate the use of pesticides and the related cost of production without increasing the quantity produced. Pest-resistant plants also can contribute to significant improvement in environmental quality. However, concerns have surfaced about the biological safety of some of the products of this new research, as well as concerns about their positive and negative social and economic consequences.

Technology Treadmill

Farmers and ranchers, like others in industry today, are literally on a technology treadmill. Once technology is introduced, it often becomes obsolete and must be replaced as newer technology is developed in an internationally competitive environment. While the U.S. once almost dominated the world in research and technology development for agriculture, it faces stiff competition from many countries today--countries that have the natural resources and labor force to be formidable competitors in the world marketplace. As the government continues to reduce the cost of farm programs in the U.S., the importance of new knowledge and technology will be even more vital to U.S. farmers and ranchers. Secretary of Agriculture Clayton Yeutter has repeatedly emphasized the importance of achieving international competitiveness for U.S. agriculture. Enhanced research and development is an inherent and inextricable element of this strategy.

"Maintenance research" is a term that has been introduced to describe the significant continuing effort needed to keep existing technology usable. For example, many plant pathogens and insects undergo continuous genetic adaptation to pesticides and cultural practices. This results in a continuing need to develop new strategies and methods to maintain operations. In my own state, we are presently addressing, on an emergency basis, the introduction of not less than five major new exotic pests which have appeared within the last five years. Maintenance research is a key component of the "base program" of agricultural research, which I will discuss in a few minutes.

Now that I have provided this background information, I will briefly summarize how the agricultural research system plans an agenda for the development of a coordinated and networked program of local, state, regional, and national research.

INPUTS FROM AGRICULTURAL RESEARCH USERS

The users of agricultural research have as much, if not more, communication with the related research community than any other group. Relationships between users and generators of research in the land-grant system are inherently close because of the planning linkages that have emerged at county and state levels, as well as the organized support for state appropriations provided by the constituencies of land-grant universities. As agricultural research, especially basic research, continues to broaden, it becomes more challenging to couple this effort with the perceived needs of individuals concerned about the food and agriculture system. The decade of the 1990s promises to bring conservationists, environmentalists, and others concerned with the safety and wholesomeness of food into the more prominent position of setting the agenda for agriculture and related life sciences research.

The agricultural research planning activity depends on a grass roots approach to identifying needs and concerns. An example of how this works in my own state might effectively illustrate this process.

Beginning at the county level, the system receives vital input from individual farmers and ranchers, both small and large, part-time and full-time. This input contributes to a state-wide planning process that involves the development of a strategic plan that addresses the needs of more than 60 commodities and a number of natural resource and environmental groups. The faculty of the Texas A&M University College of Agriculture and Life Sciences and the Texas Agricultural Experiment Station, including faculty at the regional centers across the state, form committees that interact with more than 40 industrial groups. Needs for new information and technology are identified and consolidated on a state-wide basis. Research objectives that address these needs are developed along disciplinary, interdisciplinary, multidisciplinary, or location-specific lines. The aggregation of objectives to address these needs culminates in a state-wide plan for Experiment Station research.

Individuals involved with the input include farmers, ranchers, agribusiness leaders, conservationists and environmentalists, government leaders, and policy-makers. Their input is solicited as individuals and as commodity or farm organizations. For example, major, ongoing communication about research needs is underway in the array of committees of the Texas Farm Bureau, which represents several hundred thousand farmers and ranchers with all sizes of operations and from all parts of the state.

The product of this planning process is a working management matrix. The matrix describes the form and content of the ongoing complexity of research and meets the geographic and commodity or resource-specific needs for research. The matrix also defines the multiple scientific disciplines necessary to address these needs. We refer to this matrix as the **Base Program**. The base program has internal dynamics that are sometimes hard to portray in the aggregate. However, the dynamics are always present and responsive to changing needs and opportunity. Site-specific application of new knowledge often creates a superficial impression of excessive duplication of research. We are learning how to reduce the need for this repetitious approach, but we still have work to do in this area.

From the base program and the on-going planning process, emerge new issues, problems, and opportunities that are deemed important enough to warrant the status of **New Initiatives**. Often these new initiatives are multidisciplinary in nature, usually involve more than one commodity, and have a relatively broad application. The new initiatives form the basis for advocacy of new funding at both the state and national levels. They feed into the regional and national planning process.

For example, the TAES plan identifies priority research that would require twice the funds available at the time the plan is updated. Thus, we determine how existing resources will be redirected on a continuing basis, and how we would address new research with new funding. Thus, the process is not "open-ended," but does look optimistically toward new needs and opportunities, and provides a sense of direction about where future funds should be solicited to continue focusing on the Experiment Station mission and the needs of the state, region, and country. Realism in planning is perhaps best measured by how well plans and allocations of resources are linked. In our state, and in most others, this is a relatively close relationship. We continue to work at making this linkage more explicit at the regional and national levels.

Federal formula funding (i.e., Hatch, McIntyre-Stennis) is co-mingled with state and industry funds to address new research in both the base program and the new initiatives. Flexibility and decentralized decision-making in the use of these funds often allow the state agricultural experiment stations to react to urgent regional and national needs sooner than would have been possible if the federal bureaucracy had to provide the new resources. It is important to note that these "formula funds" are used to support projects that are peer-reviewed and approved by the USDA prior to initiation.

INPUTS FROM RESEARCHERS

As indicated in the previous section, in most planning activities, an explicit engagement exists between the individuals conducting research and those using it. With applied research, this is an ongoing process involving both research faculty, the Extension

Service, and the actual users of new knowledge and technology in industry, government, etc. Specific planning interactions occur as part of the process.

The important point to note in this area is that the creativity and imagination of the researcher is the truly vital element of an institutional plan for research. Without the researcher's involvement, we will not often select an enlightened pathway for future investments, and we will certainly lack the researcher's commitment to provide the successes we seek.

Today we are involved with a new generation of scientists who are critical to agriculture, the environment, and our food supply. This group is highly creative and energetic, but its interests and activities are in areas that are not specific to a single issue or commodity. Today's scientist is interested in developing the fundamental breakthroughs that will bring quantum leaps forward in new discoveries. Developing the communication and linkages between these scientists is exciting because they can take new concepts, adapt them to practice, and successfully place them in site-specific applications across the country. Attracting the top players in life sciences research to agriculture is one of the most important tasks ahead for policy-makers and practitioners of agricultural research management.

AGRICULTURAL RESEARCH PLANNING AT THE REGIONAL AND NATIONAL LEVEL

The state agricultural experiment stations have been actively involved in strategic planning at the national level throughout the decade of the 1980s. This process continues the grassroots approach that was illustrated for local and state planning. The national agenda for the state agricultural experiment stations also embraces the concept of a **Base Program** and **New Initiatives**. The Experiment Station Committee on Organization and Policy has a subcommittee on Planning and Budget that has both regional and at-large members. This committee develops a consensus from state and regional levels to develop the SAES national agenda, the strategic plan for research.

The ESCOP strategic plan undergoes a major revision every four years, a substantive review and revision every two years, and an annual updating in each of the intervening years. The product of this process feeds immediately into the broader deliberations of the National Agricultural Research Committee and then to the Joint Council on Food and Agriculture. It also provides guidance and information back to regional and state deliberations on research priorities. It forms the basis for the recommendations made by

ESCOP and the Division of Agriculture of the National Association of State Universities and Land-Grant Colleges to the USDA and the Congress on annual budgets for agricultural research.

The ESCOP plan is undergoing a substantial four-year revision this year. A major symposium on agricultural research policy will be held here in Washington June 13-16, 1989. We hope members of this Committee and their staffs will be able to participate in this symposium. There will be a major workshop with administrator and scientist participation in late August 1989, to digest the recommendations from the policy symposium and the more than 600 inputs that have been solicited and received during the last year. These inputs come from major professional and scientific societies, agricultural commodity and farm organizations, conservation and environmental groups, and the network of planning activities across the system. The federal research agencies and Cooperative Extension Service will have active participants at the workshop. The product, a revised strategic plan, will be published in January 1990. It will be provided to the Congress as soon as possible, so it can used as input to the preparation of the new farm bill.

This new strategic plan will address the dynamics of the base program in six subdivisions of the total program. It will identify new initiatives and the resources needed to address them on a priority basis. The plan will relate new initiatives with those user groups who have identified new needs. It also will form the input to the National Agricultural Research Committee and Joint Council for the update of new initiatives that occurs in spring 1990.

The Agricultural Research Service Plan

The ARS plan has been an equally useful management device for redirecting the program of this federal agency. It has resulted in a substantive reallocation of resources and has provided an effective advocacy for new resources to address changing federal priorities. ARS is presently revising its plan and has provided a rich opportunity for input from the state agricultural experiment stations. Other federal agricultural and forestry research programs are also coordinated through the Joint Council process with the state agricultural experiment station programs.

National Agricultural Research Committee

This Committee, a part of the Joint Council, brings together the agricultural research community at the national level and seeks to develop consensus on the agenda for research across the state, private, and federal sectors. ARS administrator Dean Plowman and I currently co-chair this committee. It includes member representatives from the Agricultural Research Service, Economic Research Service, Forest Service, Colleges of Veterinary Medicine, Forestry Research Community, Home Economics Research Group, Research Directors of the Evans-Allen Institutions, and the State Agricultural Experiment Stations. This committee develops input to the Joint Council long-range plan, annual research initiatives, and an accomplishments report that are subsequently considered along with input from counterpart Extension and Resident Instruction Committees at the full Council level. At this level, recommendations are made to the Secretary of Agriculture, by the research, Extension, and teaching communities for the entire food and agriculture system.

EVALUATION OF THE PRODUCTS OF RESEARCH PLANNING

There are several key questions of a general nature that could be used to assess the effectiveness of research planning:

1. Has the process been effective in identifying critical emerging issues, problems, and opportunities at the national level?

2. Has the process achieved a consensus on the agenda for agricultural research?

3. Has the process been effective in acquiring or re-directing resources to areas of highest national priority?

4. Are revisions to the present farm bill needed to improve the effectiveness of the science and education function in the USDA?

Identifying Critical Issues and Opportunities

The system does a good job of identifying critical issues and opportunities, but this area can still be improved. An early awareness of producer-driven concerns tends to evolve from the grass roots. National issues and opportunities in biotechnology have been sufficiently recognized, as well as concerns about water quality and food safety. The system needs to improve its ability to deal with emerging issues such as global warming. There is also a need for better coupling with conservation and environmental groups at the input end of the process. In addition, we must be more effective in recruiting science power outside the traditional Colleges of

Agriculture to address agricultural problems and to more effectively link this element of the research community with the existing system. Diverse elements of the agriculture-environment-food complex are less involved in the planning process than they wish to be. Better methods of bringing these inputs into focus and perspective are needed as a part of the total input process. We are actively working to improve these interfaces and resulting plans.

Consensus on the Agenda

Attachment 1 illustrates the consensus that has emerged in the state agricultural experiment station community about priority areas for new research. The table shows the 21 initiatives that are included in the present ESCOP plan. The list is in aggregate national rank order based on ranking by individual SAES directors. The initiatives are divided into quartiles, based on these national rankings. The table shows good correlation among the four regional associations of experiment station directors about what should be included in the upper quartile or about what is most important (mostly regional scores of 1). Similarly, there is agreement about what is less important (mostly regional scores of 4). In the middle 50 percent of the research initiatives, there is a predictably wider spread of opinion between regions, representing the inherent site-specificity of agriculture and its resulting needs for different kinds of research. I would like to include, for the record, Mr. Chairman, the latest copy of the ESCOP Research Initiatives document, which provides detail on the results of the priority-setting process for 1989.

The consensus that emerges from the National Agricultural Research Committee is also impressive. Attachment 2 shows the latest aggregation of research priorities from this Committee, which were sent to the Joint Council in February 1989. As illustrated, an equally strong consensus exists across the entire research, extension, and teaching components of the Joint Council if the newest set of integrated initiatives from this body are considered (Attachment 3).

ACQUIRING OR REDIRECTING RESOURCES

The decade of the 1980s experienced modest gains in research funds in the competitive grants program of the USDA. The biotechnology initiative, originally advocated at $75 million per year, has been funded at about $20 million per year. The total competitive grants program is at $39.7 million in the FY 89 budget.

The water quality initiative has brought limited funding of $3 million in FY 89, and it has possibilities for a substantial increase in the FY 90 budget. The sciences basic to agriculture, the area of maximum new opportunity, have not been funded at nearly the level necessary to create a major critical mass so the system can exploit the opportunities available. Little or no progress has been made in acquiring additional formula funds.

The System has done a credible job of redirecting existing resources into areas of highest priority. In some states, substantial new non-federal funds have been made available. Perhaps the most impressive redirection is that which has occurred in the area of biotechnology. The Biotechnology Committee of the Division of Agriculture (NASULGC) has tracked this mobilization through a series of surveys across the system. From 1982 to 1986, for example, the full-time equivalent years of effort in biotechnology in the land-grant institutions has increased from 292 to 490 FTEs. Institutions such as Rutgers, Iowa State, University of California, and Texas A&M University are making major investments of new funds in biotechnology. There is clear evidence of the reinvestment of formula funding into higher priority areas. In addition, evidence exists of a growing competitiveness of the land-grant institutions for funds awarded through competitive grants by other federal agencies such as NIH and NSF.

Nevertheless, concerns still prevail about the health of the system. The acquisition of new funds has not been uniform, and the redirection of programs has not been consistently positive. Smaller, less affluent land-grant institutions have not been able to mobilize and take advantage of the opportunities in science that could help solve contemporary problems.

The System has not been alloted the federal resources that will be needed to maintain U.S. agriculture in a competitive position. Sufficient funds are not available to allow the life sciences research system to fully address the national concerns that exist about the intersection of agriculture and the overall ecosystems in which production agriculture operates. Research in the presently popular area of low-input, sustainable agriculture offers promise of optimizing economic return to farmers, while enhancing environmental quality through reduced agri-chemical usage.

There is also a need for substantially expanded research in the area of food safety and nutrition. In addition, excellent unexploited opportunities are available for adding value to agricultural exports and for reducing imports. There is a well-known and carefully measured rate of return on investment of research dollars in agriculture of between 30 percent and 50 percent per year, depending on the commodity. A clear imbalance exists between basic and applied research in agriculture and between competitive grants and other grants which must be addressed. A major new initiative in agricultural research is needed to activate a better relationship between obvious needs and measured benefits.

In summary, the planning process for agricultural research has developed a vital consensus on new initiatives and new funding needs. This is a necessary but not sufficient condition to result in new funding in the present era of budget restrictions. What is needed now is effective advocacy of the new resources that are required and the acquisition of new funds that will allow agricultural research to take advantage of the unique opportunities that exist today to develop and use new technology.

Possible Revisions to the Present Farm Bill

The land-grant community that I represent has several active studies underway which are examining possible changes to the farm bill. I would urge the Committee to allow these studies to be submitted for consideration when they are completed. I believe I would represent this community fairly if I said that there is generally a positive feeling about Title XIV of the present bill. Certainly, there is strong consensus in this community that the present science and education institutions are serving important and continuing needs. Some elements of Title XIV might be mentioned at this point as being appropriate for re-evaluation:

1. The authorization levels for various elements of Title XIV might be reevaluated. We believe there may be a need for additional authorization for research funding in several areas.

2. Methods for providing for facilities and equipment funds on an equitable merit basis for the land-grant institutions might be considered.

3. Improved methods for interaction between the special research needs recognized by the Congress with the needs that emerge from the System planning process should be considered.

4. Improved methods for Congressional participation in setting the agenda for competitive grants is another area of possible need. It would be helpful if Congress had a better method of appropriating funds to areas of research

it perceives to be high priority. Subsequent actions may be needed to select recipients of these funds based on a peer-reviewed competitive award system.

CONCLUSIONS

Mr. Chairman, I appreciate the opportunity to provide this testimony to the Committee. In summary, we believe that the planning process for agricultural research has been substantially improved in the decade of the 1980s. We believe that the general tenets of the present farm bill that address planning and the Joint Council on Food and Agriculture are sound, although we would like the opportunity to make specific recommendations when ongoing studies are completed. We believe the planning procedures of the 1990s must be even further improved to be as effective as they should be. We hope that the planning and appropriations process might be better linked.

Finally, we hope that the critical needs and importance of agriculture in the U.S. might be better recognized in relation to other parts of the economic base of this country. We believe we must be more effective in advocating the kind of new resources needed to make the agricultural industry competitive, environmentally sound, and responsive to growing consumer concerns about the safety, quality, and wholesomeness of our food.

Attachment 1

*NATIONAL and REGIONAL PRIORITY ORDER of the RESEARCH INITIATIVES

INITIATIVE	AVR. RANK OF FOUR REGIONS	QUARTILE RANKING	QUARTILE RANKING BY REGION			
			NE	SO	NC	WE
1. Maintain & Protect Water Quality & Quantity	2.3	Upper Quartile	1	1	1	1
2. Biotechnology	3.35		1	1	1	1
3. Improved Management of Crop Pests & Diseases	6.45		1	1	2	1
4. Genetic Improvement of Econom. Important Plants	6.82		1	1	1	2
5. Sustaining Soil Productivity	7.87		2	1	1	2
6. New & Expanded Uses for Agri. & Forest Products	8.00		2	2	1	1
7. Interrerlationships of Food & Nutritional Health	8.25	Upper Middle Quartile	1	2	2	1
8. Animal Health & Disease	8.67		1	2	2	1
9. Food Processing, Safety & Quality Enhance	8.87		2	2	2	2
10. Animal Efficiency in Food Production	9.00		2	1	1	2
11. Marketing of Agricultural & Forest Products	10.47		2	2	3	2
12. Integrating Agricultural Technologies	12.00	Lower Middle Quartile	3	2	2	3
13. Rural Youth, Family & Community Well-Being	12.87		3	4	3	3
14. Impact of National & International Policies on Agricultural & Forestry Markets	13.80		4	3	3	3
15. Agricultural & Forest Land Use	14.55		2	3	4	4
16. Energy Efficient Systems	15.47		3	3	3	4
17. Forest Productivity	15.52	Bottom Quartile	4	3	4	3
18. Productivity of Range & Pastureland	15.57		4	4	3	3
19. Effects of Atmospheric Deposition on Ecosystems	16.52		2	4	4	4
20. Sensors & Computing Systems for Food & Agri.	16.77		4	4	4	4
21. Plants for the Urban Environment	18.27		4	4	4	4

*Table taken from RESEARCH INITIATIVES - An Update of the Research Agenda for the State Agricultural Experiment Stations January 1989

Attachment 2

*NATIONAL AGRICULTURAL RESEARCH COMMITTEE INITIATIVES - 1989

1. Maintain and Protect Water Quality and Quantity
2. Biotechnology
3. Genetic Improvement of Economically Important Plants
4. Sustaining Soil Productivity
5. Improved Management of Crop Pests and Diseases
6. Food Processing, Safety, and Quality Enhancement
7. New and Expanded Uses for Agricultural and Forest Products
8. Global Change
8. Interrelationships of Food and Nutrition and the Health Status of People
10. Animal Health and Disease
11. Animal Efficiency in Food Production
12. Integrating Agricultural Technologies
13. Marketing of Agricultural and Forest Products
14. Agricultural and Forest Land
15. Rural Family and Community Well-Being
16. Forest Productivity
17. Energy Efficient Systems
17. Impact of National and International Policies on Agricultural and Forest Markets
19. Productivity of Range and Pastureland
20. Sensors and Computing Systems for Food and Agriculture
21. Plants for the Urban Environment

*Information taken from the Joint Council on Food and Agricultural Sciences Fiscal Year 1991 Priorities for Research, Extension, and Higher Education

Attachment 3

*Joint Council on Food and Agricultural Sciences
Fiscal Year 1991 Priorities

1. Improve Water Quality and Quantity
2. Expand Biotechnology and Its Application
3. Develop Agricultural Production Systems Compatible with the Environment
4. Nurture Excellence by Developing Food and Agricultural Scientific and Professional Talent
5. Improve Understanding of Diet, Human Nutrition, and Health Relationships
6. Enhance Competitiveness of U.S. Agriculture
7. Genetically Improve Economically Important Plants
8. Improve Food Processing, Safety, and Enhance Quality
9. Measure Potential Effects of Global Climate Changes on Agricultural and Forestry Productivity
10. Enhance Control of Agricultural and Forestry Pests and Diseases
11. Develop New and Expanded Uses for Agricultural and Forest Products
12. Enhance Rural Economic Development

*Information taken from the Joint Council on Food and Agricultural Sciences Fiscal Year 1991 Priorities for Research, Extension, and Higher Education

Research Initiatives

An Update of the Research Agenda for the State Agricultural Experiment Stations

January 1989

The Experiment Station Committee on Organization and Policy
in cooperation with the Cooperative State Research Service

Other publications in this series:

Research 1984: The State Agricultural Experiment Stations

Research Perspectives: Proceedings of the Symposium on the Research Agenda for the State Agricultural Experiment Stations

Research Initiatives: A Research Agenda for the State Agricultural Experiment Stations

Research Dynamics: The Base Program of Research in the State Agricultural Experiment Stations

Research Initiatives: A Midterm Update of the Research Agenda for the State Agricultural Experiment Stations, January 1988

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Research Initiatives
January 1989

ESCOP 89-1

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Foreword

This update of *Research Initiatives* is a fresh statement of the research agenda of the State Agricultural Experiment Stations, which can be used in the planning and budgeting processes at the federal and state levels. The review process used to develop this agenda occurs in the third year of the four-year planning cycle of the Planning Subcommittee of the Experiment Station Committee on Organization and Policy. The 21 initiatives developed at the planning workshop in Atlanta in 1985 and published in January 1986 have been reviewed annually in relation to emerging needs and opportunities. The next major change in the research agenda will occur later this year, when input will be requested from both inside and outside the State Agricultural Experiment Station system to develop a new set of initiatives for publication in 1990. The goal of the current review process was to reassess priorities and revise specific language.

In developing the updated statement of the research agenda, suggestions for changes and recommendations for new initiatives were collected by the members of the Planning Subcommittee of ESCOP from individual state agricultural experiment station directors through the regional associations and from the affiliate groups (including Home Economics, Forestry, Veterinary Medicine, and the 1890 institutions). These were brought to a review session of the Planning Subcommittee. The initiatives were ranked by each state agricultural experiment station director and these scores were used to develop the regional and national priorities. The outcome of this process is reported in this publication.

The ESCOP Planning Subcommittee wishes to thank the Cooperative State Research Service of the U.S. Department of Agriculture for its continuing support of the planning efforts of the State Agricultural Experiment Stations and for partial support of this publication.

The efforts of numerous people have gone into the overall planning process, including members of ESCOP, CSRS, and the affiliate groups. Thanks go to the state agricultural experiment station directors, to the members of ESCOP, and to the members of the Planning Subcommittee for their outstanding efforts on this update of the research agenda.

Neville P. Clarke, Chairman
ESCOP Planning Subcommittee

Introduction

The State Agricultural Experiment Stations (SAESs) are key players in the total U.S. agricultural research capability. The state-federal relationships resulting from the passage of the Hatch Act in 1887 have fostered a national network of communication and collaboration. This partnership has allowed the development of a system of agricultural research which meets the needs of U.S. agriculture, addressing both regional and national concerns. State support for agricultural research has grown since the partnership was formed, but greater federal support is needed for the broad research initiatives that can be most effectively addressed by the SAESs.

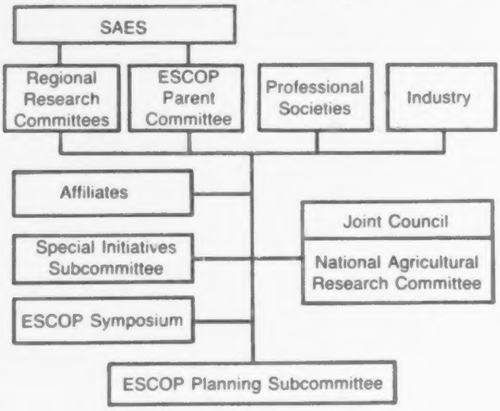
Acquiring new knowledge and technology can reduce some of the problems facing U.S. agriculture today. Other problems, such as the impacts of international monetary policy and domestic farm policy, cannot be solved by research alone. Yet, these factors play a key role in planning future agricultural research. Whatever outcome is envisioned in relation to international and domestic policy, an urgent need will remain for a continuing infusion of new agricultural knowledge and technology for this country. The ability to produce food and fiber at the lowest possible cost will continue to be a requisite of successful farming operations, regardless of the outcome of the present crisis in agriculture.

ESCOP Planning Subcommittee

The need for a national research agenda for the SAESs already existed, but the current crisis was an impetus to develop national strategies to guarantee an infusion of the new knowledge and technology needed to reduce production costs and maintain or improve the competitiveness of U.S. agriculture. The Experiment Station Committee on Organization and Policy (ESCOP) took the first step by establishing a Planning Subcommittee in 1984. The subcommittee was assigned the task of writing a contemporary statement of the research agenda of the State Agricultural Experiment Stations.

In 1985, the Planning Subcommittee sought and received input for the research agenda from numerous individuals and organizations representing a broad spectrum of interests (Figure 1).

Figure 1. Inputs to the ESCOP Planning Subcommittee


SAES
Regional Research Committees
ESCOP Parent Committee
Professional Societies
Industry
Affiliates
Joint Council
Special Initiatives Subcommittee
National Agricultural Research Committee
ESCOP Symposium
ESCOP Planning Subcommittee

The symposium held in June 1985 brought input not only from SAES administrators and scientists, but also from senior representatives of the Reagan Administration, the Congress, the Users Advisory Board, industry, and from constructive critics both inside and outside the SAES system. The symposium participants and discussion sessions provided important input to the subsequent planning workshop held in August 1985.

Through the regional research committees and the parent committee, ESCOP, the SAESs were well represented in the planning process. In addition, professional societies with agricultural interests and various commodity groups, farm organizations, and agricultural industries were asked to provide their assessments of research needs and opportunities (Tables 1 and 2). A rough draft of the initiatives and objectives developed at the Atlanta workshop was circulated back to the participating organizations for their feedback.

Table 1: Scientific and Professional Organizations

- Agricultural Research Institute
- American Agricultural Economics Association
- American Dairy Science Association
- American Home Economics Association
- American Phytophathological Society
- American Society for Ecology and Viticulture
- American Society of Agricultural Engineers
- American Society of Animal Science
- American Society of Biological Chemists
- American Society of Plant Physiologists
- American Society of Range Management
- Association of American Veterinary Medical Colleges
- Crop Science Society
- Fish and Allied Aquatics Society
- National Industry-State Agricultural Research Council
- Rural Sociological Society
- Society for Industrial Microbiology
- Society of Wood Science & Technology
- Soil Science Society of America
- Weed Science Society of America
- Joint Council on Food and Agricultural Sciences
- National Agricultural Research Committee
- North Central Regional Research Committee
- Northeast Regional Research Committee
- Southern Regional Research Committee
- Western Regional Research Committee
- ESCOP Research Planning Symposium
- ESCOP Special Initiatives Subcommittee
- ESCOP Home Economics Research Subcommittee

Table 2: Industry and Farm Organizations

- American Association of Nurserymen
- American Farm Bureau
- American Forage and Grassland Council
- American Meat Science Association
- American Seed Trade Association
- American Soybean Association
- Farm and Industrial Equipment Institute
- Forest Farmers Association
- Grocery Manufacturers of America
- Grain Sorghum Producers
- National Institute of Food Technologists
- National Agricultural Chemicals Association
- National Alliance of Independent Crop Consultants
- National Association of Conservation Districts
- National Association of Wheat Growers
- National Broiler Council
- National Cattlemen's Association
- National Cotton Council of America
- National Grain and Feed Association
- National Grange
- National Pest Control Association
- National Pork Producers Council
- National Turkey Federation
- Potash and Phosphate Institute
- Sheep Industry Development Program
- Southeastern Poultry and Egg Association
- Southern Industrial Forest Research Council
- The Irrigation Association
- The Poultry Science Association
- U.S. Animal Health Association

The ESCOP affiliates (including Home Economics, Forestry, Veterinary Medicine, and the 1890 institutions) and the Special Initiatives Subcommittee of ESCOP actively participated in the symposium and the Atlanta workshop. Other federal agencies involved in agricultural and forestry research and representatives of the Cooperative Extension Service participated in the symposium and provided input to the draft of the planning document. Because the chairs of the Joint Council regional research committees were also assigned to the ESCOP Planning Subcommittee, maximum use was made of the earlier thinking at the regional level to develop the national SAES agenda.

Four-Year Planning Cycle

The planning process that began in 1985 will be repeated on a four-year cycle. The major symposium and workshop activities which culminated in the 1985 research initiatives statement will be repeated in 1989 (Figure 2). The result of the 1989 activities will be a new set of initiatives and objectives published in 1990. In the four-year planning cycle, initiatives will be reviewed annually in the intervening three years, providing an opportunity for ESCOP to reassess needs, opportunities, and priorities with input from the SAES directors. These annual revisions are usually not major departures from the original agenda, but are relatively minor revisions.

This report is the third-year update in the four-year planning cycle of the SAES research agenda. It is intended to be primarily an update of priorities.

Direct input from outside the SAES community will be obtained only in the fourth year of the planning cycle. However, the SAES directors and scientists are in constant contact with a majority of those organizations, agencies, and societies, and their changing perceptions are reflected in this update.

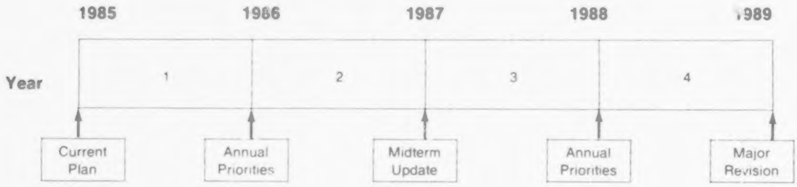
Method

This update of the national SAES research agenda follows a review of the 21 initiatives and 99 research objectives originally developed and prioritized at the Planning Workshop in Atlanta in 1985. These initiatives have been revised annually to reflect emerging needs, new opportunities, and changing priorities within the regions and across the entire SAES system.

For this third annual review, suggestions for minor revisions to the previous agenda were collected from SAES directors and affiliate groups in each of the four regions. These suggestions were brought forward by the directors-at-large to the 1988 review session of the Planning Subcommittee. This review session occurred Sept. 14, 1988, in Washington, D.C.

The final 21 initiatives developed at the review session were distributed by the directors-at-large to the SAES directors in each of their respective regions. Each director was asked to rank the initiatives, and these scores were used to develop the regional and national priority ranking (Table 3). This rank ordering, which is designed to meet the requirements of the National Agri-

Figure 2. Four-Year Planning Cycle for SAES Research Agenda



cultural Research Committee, also allows the development of a national consensus of the highest priority initiatives.

The individual state priority rankings of initiatives were averaged at the regional level and then grouped by quartiles to identify four broad rankings of priority. National consensus is reflected by the degree to which quartile rankings are comparable across regions. Clearly, a strong consensus exists across regions about which research initiatives are most and least important; that is, which ones fall in the first and fourth quartiles. There is less consensus between regions on the relative priorities of initiatives in the second and third quartiles, obviously reflecting regional differences in agriculture and related research needs. The prioritization process reflected in Table 3 has enabled the Planning Subcommittee to successfully obtain a consensus across the regions on a national research agenda.

Though some consolidations, revisions, and deletions occurred in writing the current SAES research agenda, substantial continuity with the 1985 agenda remains. The goal of the third-year agenda update is to provide a vehicle to capture new research needs and opportunities and changing research priorities. Changes in perceptions of priority are exemplified in the movement of the initiative, "Interrelationships of Food and the Nutritional and Health Status of People," from 10th place in the previous annual review process to 7th place in the current ranking of priorities.

For each of the 21 major initiatives in the current agenda, several specific objectives are defined to show how the initiative can be achieved. These 21 initiatives and 105 objectives are summarized in Table 4.

Each major research initiative statement includes: (1) a description of the current situation and justification for research; (2) the thrust or goal of the research initiative; (3) a brief statement of the research objectives necessary to accomplish the initiative; and (4) total resources necessary to implement each initiative.

Overall, these initiatives are rather broad statements of goals that could bring a balanced infusion of new knowledge and technology to U.S. agriculture. This updated research agenda will provide the SAES input not only to the ESCOP budget process, but also to the National Agricultural Research Committee, which will carry it forward to the Joint Council.

Resource Needs

As part of the 1985 planning process, estimates were made of the resources needed to undertake each of the research initiatives, including new scientist-years (SYs), start-up costs, and continuing costs. An iterative process was used to determine the final estimates. The resources to be allocated to each initiative were constrained to fit within an overall 20 percent increase. Decisions were based on inputs from the workshop and other estimates of relative priority.

For this update, the Planning Subcommittee did not develop new recommendations on the resources required to accomplish the individual research objectives or the overall initiatives. Instead, decisions made in 1985 were reaffirmed and in limited cases, where consolidations or deletions occurred, or new initiatives were created, estimates of resources were provided informally to the several budget committees of ESCOP. Table 5 lists the resource needs for each of the 21 initiatives in the contemporary agenda.

Table 3: National and Regional Priority Order of the Research Initiatives

Priority	Initiative	Average Score of 4 Regions	Quartile Ranking	Quartile Ranking by Region			
				NE	SO	NC	WE
1.	Maintain and Protect Water Quality and Quantity	2.3	(1) Top Quartile	1	1	1	1
2.	Biotechnology	3.35		1	1	1	1
3.	Improved Management of Crop Pests and Diseases	6.45		1	1	2	1
4.	Genetic Improvement of Economically Important Plants	6.82		1	1	1	2
5.	Sustaining Soil Productivity	7.87		2	1	1	2
6.	New and Expanded Uses for Agricultural and Forest Products	8.00		2	2	1	1
7.	Interrelationships of Food and the Nutritional and Health Status of People	8.25	(2) Upper Middle Quartile	1	2	2	1
8.	Animal Health and Disease	8.67		1	2	2	1
9.	Food Processing, Safety, and Quality Enhancement	8.87		2	2	2	2
10.	Animal Efficiency in Food Production	9.00		2	1	1	2
11.	Marketing of Agricultural and Forest Products	10.47		2	2	3	2
12.	Integrating Agricultural Technologies	12.00	(3) Lower Middle Quartile	3	2	2	3
13.	Rural Youth, Family, and Community Well-Being	12.87		3	4	3	3
14.	Impact of National and International Policies on Agricultural and Forestry Markets	13.80		4	3	3	3
15.	Agricultural and Forest Land Use	14.55		2	3	4	4
16.	Energy Efficient Systems	15.47		3	3	3	4
17.	Forest Productivity	15.52	(4) Bottom Quartile	4	3	4	3
18.	Productivity of Range and Pastureland	15.57		4	4	3	3
19.	Effects of Atmospheric Deposition on Ecosystems	16.52		2	4	4	4
20.	Sensors and Computing Systems for Food and Agriculture	16.77		4	4	4	4
21.	Plants for the Urban Environment	18.27		4	4	4	4

Table 4: Initiatives and Objectives

1. **Maintain and Protect Water Quality and Quantity**
    - Groundwater Quality
    - Water Quantity
    - Water Use Efficiency
    - Conservation Practices
    - Water Use Policy
    - Household Water Use
2. **Biotechnology**
    - Plant Productivity
    - Plant Disease Resistance
    - Nutritional Quality of Plants
    - Biological Control of Pests
    - Biologically Active Materials
    - Diagnostic & Immunologic Products
    - Animal Disease Resistance
    - Animal Development & Productivity
    - Impacts of Biotechnology
3. **Improved Management of Crop Pests and Diseases**
    - Incidence, Prediction, & Management
    - Pesticide & Pest Management
    - Quantifying Constraints to Plant Productivity
    - Epidemiological Systems
    - Biological Control Techniques
    - Integration of Pest Management into Crop Production Systems
    - Pesticide Application Technology & Formulation Chemistry
4. **Genetic Improvement of Economically Important Plants**
    - Gene Characterization
    - Germplasm Acquisition & Maintenance
    - Plant Breeding
    - Resistance to Pests
    - Soil Microorganisms
    - Consumer Preferences
    - New Uses for Plant Products & Components
5. **Sustaining Soil Productivity**
    - Erosion-Soil Property Relationships
    - Soil Conservation Policy
    - Soil Conservation Economics
    - Status of Soil Productivity
    - Tillage Management Interactions
    - Soil Dynamics
6. **New and Expanded Uses for Agricultural and Forest Products**
    - New and Alternative Crops
    - Processing Technologies
    - Added Value
7. **Interrelationships of Food and the Nutritional and Health Status of People**
    - Human Nutritional Requirements
    - Dietary Practices
    - Nutritional Quality of Foodstuffs
    - Bioavailability of Nutrients
    - Health Influences from Diet
8. **Animal Health and Disease**
    - Immunological Advances
    - Integrated Health Management
    - Epidemiology of Animal Diseases
    - Residue & Toxicology Studies
9. **Food Processing, Safety, and Quality Enhancement**
    - Processing and Preservation
    - Quality Enhancement
    - Food Safety
    - By-Products and the Environment
10. **Animal Efficiency in Food Production**
    - Animal Genetics
    - Reproductive Physiology
    - Animal Nutrition
    - Animal Protein and Lipid Synthesis
    - Animal Management Systems
11. **Marketing of Agricultural and Forest Products**
    - Supply, Demand, & Price Relationships
    - Grades & Standards
    - Market Efficiency & Performance
    - International Market Development
    - Market Strategies & Power
    - Consumer Preferences & Quality
12. **Integrating Agricultural Technologies**
    - Assessment of New Technologies
    - Market Forces & Enterprise Profitability
    - Capital Investment & Financial Requirements
    - Integrated Systems
    - Alternative Systems
    - Optimal Input Systems

Initiatives and Objectives (continued)

13. **Rural Youth, Family, and Community Well-Being**
    - Economic Alternatives & Diversification
    - Family Stress Factors
    - Displacement Assistance
    - Resource Management
    - Environmental & Safety Factors for Families
    - Organizing Capacities & Governance of Communities
    - Interdependence Among Agriculture, Families, & Communities
14. **Impact of National and International Policies on Agricultural and Forestry Markets**
    - Commodity, Factor, & Financial Market Relationships
    - Political Economy of Domestic & Foreign Commodity Policy
    - Comparative Productivity Growth & Competition in World Markets
    - Impacts of Emerging Technological Changes for Public Policy
    - Policy & Institutional Design
15. **Agricultural and Forest Land Use**
    - Land Use Policies, Land Values, & Tax Base
    - Land Use Alternatives
    - Recreation Resource Management
    - Consolidation of Forest & Agricultural Land Information
16. **Energy Efficient Systems**
    - Efficient Plant & Animal Production & Processing Systems
    - Efficient Energy Conversion Technologies
    - Alternative Sources
    - Extraction Procedures & Practices
17. **Forest Productivity**
    - Silvicultural Techniques & Practices
    - Genetics & Superior Tree Production
    - New Processes, Products, & Uses for Wood
    - Forest Health
18. **Productivity of Range and Pastureland**
    - Rangeland Ecology & Management
    - Plant/Animal Interactions
    - Water Management
    - Plant Improvement
    - Weed & Brush Management
19. **Effects of Atmospheric Deposition on Ecosystems**
    - Chemical Exposures
    - Amount-Response Relationships
    - Accumulation of Toxicants in Plants and Animals
20. **Sensors and Computing Systems for Food and Agriculture**
    - Sensor Technology Development
    - Electronic Systems for Plant & Animal Production
    - Electronic Systems for Food Processing
21. **Plants for the Urban Environment**
    - Plant Materials
    - Management & Maintenance Strategies

Table 5: Resource Needs by Initiative

Initiative	Funds $ × 1,000	
	One-Time	Continuing
1. Maintain and Protect Water Quality and Quantity	$48,225	$25,440
2. Biotechnology	91,375	38,700
3. Improved Management of Crop Pests and Diseases	11,250	7,500
4. Genetic Improvement of Economically Important Plants	13,875	9,750
5. Sustaining Soil Productivity	18,750	11,951
6. New and Expanded Uses for Agricultural and Forest Products	31,500	21,000
7. Interrelationships of Food and the Nutritional and Health Status of People	31,750	16,200
8. Animal Health and Disease	42,500	18,000
9. Food Processing, Safety, and Quality Enhancement	42,500	18,000
10. Animal Efficiency in Food Production	31,875	13,500
11. Marketing of Agricultural and Forest Products	3,000	2,400
12. Integrating Agricultural Technologies	15,000	12,000
13. Rural Youth, Family, and Community Well-Being	7,500	6,000
14. Impact of National and International Policies on Agricultural and Forestry Markets	7,500	6,000
15. Agricultural and Forest Land Use	15,750	10,500
16. Energy Efficient Systems	5,400	3,060
17. Forest Productivity	12,875	7,650
18. Productivity of Range and Pastureland	7,500	6,000
19. Effects of Atmospheric Deposition on Ecosystems	4,600	2,790
20. Sensors and Computing Systems for Food and Agriculture	31,875	13,500
21. Plants for the Urban Environment	7,500	6,000
TOTAL	$482,100	$255,941

Summary

U.S. agriculture, now more than ever, needs new technology that will restore and enhance profitability. The ability to compete successfully in the international marketplace must be retained and expanded. With the emerging opportunities in the basic sciences, the potential for providing an infusion of new technology into agriculture has never been greater.

This contemporary statement of national research priorities of the State Agricultural Experiment Stations builds on a broad base of ongoing research activity and capability inside and outside the SAES system. Implementing this agenda will help to sustain and enhance agriculture as a healthy and robust part of the U.S. economy and improve agriculture's ability to provide high-quality food and fiber at affordable prices. And the new knowledge and technology emerging from these initiatives will go far toward ensuring the conservation of natural resouces and the preservation of environmental quality.

New Initiatives

Maintain and Protect Water Quality and Quantity

Situation

Water is a significant cost factor in production, and both the quantity and quality of water available for agriculture are declining. Approximately 86 percent of the total water resource in the continental United States is in groundwater aquifers. Agriculture uses 68 percent of the groundwater withdrawn, and half the U.S. population depends on groundwater for drinking water. Research is needed on surface water contamination as well as sediment and chemical movement from agricultural land. The protection and efficient use of our water resources are crucial to both agricultural production and economic stability. The key will be developing integrated systems for conserving water and maintaining water quality.

Research Thrust

To provide an adequate quantity and acceptable quality of water while sustaining agricultural, industrial, residential, and municipal activities.

Objectives

1. **Groundwater Quality.** Determine the nature of surface and subsurface flow in forest and agricultural areas; determine the impacts of transport of sediments and chemicals; and assess the risks of groundwater contamination.
2. **Water Quantity.** Develop techniques to increase water yield and availability.
3. **Water Use Efficiency.** Develop water management and irrigation systems that make efficient use of water while minimizing water quality degradation.
4. **Conservation Practices.** Develop integrated systems and procedures that will conserve existing water supplies and prevent soil erosion, including economical, nonchemical, crop and forest production practices, and new varieties of crops.
5. **Water Use Policy.** Develop models for the allocation, efficient pricing, and equitable distribution of water resources.
6. **Household Water Use.** Determine the impact of water quality on household use, family health, and consumer practices.

		($ x 1000)	
Resources:	Scientist Years	Start-up Costs	Annual Costs
	160	$48,225	$25,440

Biotechnology

Situation

Recent developments in the areas of cellular and molecular biology have provided scientists with new and powerful tools for improving economically important plants, animals, and microorganisms. It is now possible to isolate functional genes from one organism and transfer them into another organism, using recombinant DNA techniques. Efficient cell, tissue, and embryo cultures have been developed for many plant and animal species. The basic chemical structure of genes not only can be directly determined, but genes also can be synthesized in the laboratory from the fundamental components of DNA. Progress is rapid in elucidating gene structure, function, and control of gene expression. Understanding the genetic control of fundamental biological processes is a vital step in improving plants, animals, and microorganisms for agriculture.

Research Thrust

To understand the molecular and cellular processes in plants and animals and the inheritance of these functions, so that genetic materials can be manipulated to improve the production, quality, and quantity of food and fiber. To assure environmental safety and compatibility of genetically modified products.

Objectives

1. **Plant Productivity.** Manipulate plant metabolism, alter chemical composition of plant products, improve processing quality, and produce plants resistant or tolerant to stress or herbicides.
2. **Plant Disease Resistance.** Accelerate the process of developing resistance to plant diseases and insects.
3. **Nutritional Quality of Plants.** Correct nutrient deficiency, prevent loss of nutrients during storage, and eliminate or modify undesirable nutritional properties of plants, such as the composition and quality of saturated fatty acids.
4. **Biological Control of Pests.** Develop highly specific organisms that adversely affect insect pests of crops and livestock.
5. **Biologically Active Materials.** Produce large quantities of biologically active materials such as growth and reproductive hormones and new vaccines or diagnostic tools.
6. **Diagnostic and Immunologic Products.** Produce new vaccines and diagnostics for animal agriculture.
7. **Animal Disease Resistance.** Develop genetic disease resistance in livestock species.
8. **Animal Development and Productivity.** Augment and improve breeding programs to enhance productivity in livestock. Modify genetic systems to reduce levels of saturated fat in meats while retaining palatability.
9. **Impacts of Biotechnology.** Assess the effect of biotechnology on agricultural operations and the structure of rural communities. Assess the potential impact of introducing genetically engineered organisms into the environment.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	205	$91,375	$38,700

Improved Management of Crop Pests and Diseases

Situation

Crop pests raise production costs, reduce yields, and lower quality. Mismanagement of pesticides not only causes environmental problems but also leads to rapid build-up of resistant pest populations. Pests of all types are very adaptive and often can evolve strains resistant to pesticides and to pest-resistant crops, resulting in greater crop losses and/or increased use of chemicals. Improved pest and pesticide management strategies are needed to cope with these genetic modifications and population changes in pest organisms. Through plant breeding and genetics, we can reduce chemical requirements, deal with changes in pest populations, and improve product quality while preserving the environment. Specific research is needed: 1) to improve pest population detection and identification using computer-based forecasting; 2) to define the role of naturally occurring phenomena in altering pest/host interactions; 3) to develop data processing programs for correlating crop and pest data with climatic, edaphic, economic, and social factors; and 4) to develop the basic and applied technology needed to devise strategies for preventing or delaying the evolution of pest strains resistant to pesticides and pest-resistant crops.

Research Thrust

To develop economically feasible and environmentally safe systems for managing plant pathogens, insects, nematodes, weeds, rodents, and pesticides.

Objectives

1. **Incidence, Prediction, and Management.** Develop computer models that predict plant pest occurrence and density, and determine optimal control measures.
2. **Pesticide and Pest Management.** Develop strategies and tactics to prevent or delay the development of pesticide resistance and host-resistant pests; to maximize the effects of pesticides on target organisms; and to minimize environmental contamination.
3. **Quantifying Constraints to Plant Productivity.** Measure the ability of plants to tolerate biotic and abiotic stresses and determine which types have natural pest resistance or tolerance.
4. **Epidemiological Systems.** Develop rapid, economical, and reliable methods for quantitatively analyzing plant pest epidemics to assist producers in forecasting pest outbreaks, predicting losses, and evaluating alternative management strategies.
5. **Biological Control Techniques.** Develop biological control agents and strategies for economically important plant pests.
6. **Integration of Pest Management into Crop Production Systems.** Analyze the biotic and abiotic factors affecting the relationship between pests and plants; develop programs that integrate management strategies for all pest classes into total crop production systems.
7. **Pesticide Application Technology and Formulation Chemistry.** Develop equipment and methodologies for safe, precise application of pesticides; develop improved, novel formulations for safe, target-precise placement of pesticides.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	50	$11,250	$7,500

Genetic Improvement of Economically Important Plants

Situation

Productivity of plants can be substantially improved through breeding and genetic manipulation. Germplasm acquisition and maintenance, and characterization of desired traits and their inheritance can lead to the development of highly efficient new varieties and cultivars that resist many common pests and environmental stresses. In addition, these genetic improvements can affect product uniformity, beginning and length of growing season, chemical components, plant health and vigor, and overall efficiency and yield. Genetic improvements in pest-resistant cultivars also could reduce current concerns about chemical and pesticide contamination.

Research Thrust

To develop highly efficient plants that genetically resist pests and tolerate environmental stresses, and to improve plant products by acquiring germplasm resources with genetic variability.

Objectives

1. **Gene Characterization.** Identify genetic elements that determine: (a) superior physiological and morphological traits, and (b) responses to environmental stress.
2. **Germplasm Acquisition and Maintenance.** Collect, evaluate, enhance, and maintain germplasm of economically important plant species.
3. **Plant Breeding.** Develop techniques and procedures that will incorporate identified genetic elements into improved cultivars for cropping and production systems.
4. **Resistance to Pests.** Identify genetic bases for resistance to pests such as nematodes, pathogens, insects, and weeds, and incorporate genetic resistance into cultivars.
5. **Soil Microorganisms.** Determine the capacity of plants to utilize and interact with beneficial soil microorganisms such as rhizobia and mycorrhizae, and analyze their impacts on plant nutrition.
6. **Consumer Preferences.** Utilize genetic variability to alter plant composition and content to enhance quality characteristics that meet specific consumer demands.
7. **New Uses for Plant Products and Components.** Identify specific plant products and/or components that can serve as alternative sources for fuel, fiber, and chemicals.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	70	$13,875	$9,750

Sustaining Soil Productivity

Situation

The soil is a primary determinant in the production of food and fiber. Wind and water erosion leads to significant losses of soil and environmental degradation, and threatens the long-term productivity of cropland and large portions of rangeland and forestland. Yet, in an effort to minimize production costs and maximize economic stability, farmers are using production methods, tillage practices, and equipment that contribute to soil erosion and declining soil productivity. Data are available on the distribution, kinds, and properties of soils, but data bases have not been developed to quantitatively assess the effects of different cropping systems on basic soil properties affecting productivity. Tillage systems, such as no-till and minimum tillage, may reduce soil erosion while sustaining or even enhancing productivity. But data are needed on the long-term success of these practices with regard to the interaction of soil type, plant variety, fertilizer needs and practices, equipment, planting and harvesting practices, cropping sequences, and pest management on crop production.

Research Thrust

To develop economically feasible soil management systems that protect the soil resource while reducing the need for inputs to maintain productivity.

Objectives

1. **Erosion-Soil Property Relationships.** Identify the effects of erosion on chemical, physical, and biological properties of soil and develop soil productivity indices.
2. **Soil Conservation Policy.** Measure the effects of alternative policies on the adoption of soil-conserving practices and technologies on farms of various sizes.
3. **Soil Conservation Economics.** Evaluate the economic aspects of alternative soil erosion control practices.
4. **Status of Soil Productivity.** Evaluate the impacts of different management systems on soil productivity.
5. **Tillage Management Interactions.** Define the interrelationships among tillage practices and other components of crop production systems--including soil type, crop rotation and sequences, planting and harvesting methods, varieties, fertilizer practices, and pest management.
6. **Soil Dynamics.** Determine the roles of weathering, nutrient mobility, and natural acidity on the dynamics of forest soil.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	76	$18,750	$11,951

New and Expanded Uses for Agricultural and Forest Products

Situation

Current supplies of many agricultural and forest products exceed demand. Some alternative uses for agricultural and forest products may only replace current uses with no net gain to agriculture or forestry enterprises. The real need is to use a significant number of acres to produce new products to meet market needs, with a particular emphasis on industrial and non-food products.

Research Thrust

To develop an array of new agricultural and forest products to meet consumer needs for industrial and non-food products.

Objectives

1. **New and Alternative Crops.** Develop new crops for specialty needs of industry and non-food uses.
2. **Processing Technologies.** Develop processes for using raw agricultural and forest products to produce new products.
3. **Added Value.** Develop new technologies for conversion of low-value components or by-products of agricultural and forest commodities into high-value specialty products to meet market needs.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	140	$31,500	$21,000

Interrelationships of Food and the Nutritional and Health Status of People

Situation

Food production and processing methods affect the safety and nutritional quality of food products. This, in turn, affects human health and nutrition. Research is needed on the social, cultural, ethnic, behavioral, economic, and environmental factors that influence consumer preferences and dietary practices. The bioavailability of nutrients from various sources and the interactions between foods and other substances must be evaluated. To accomplish these goals, researchers need to develop improved methods of conducting human nutritional studies, which will facilitate the design and assessment of nutrition programs and policies.

Research Thrust

To improve the nutritional and health status of the population by determining the effects of food quality, bioavailability of nutrients, and dietary practices on health.

Objectives

1. **Human Nutritional Requirements.** Determine more precisely the nutritional requirements of individuals as influenced by age, sex, occupation, lifestyle, and climatic conditions.
2. **Dietary Practices.** Identify economic, behavioral, social, cultural, and environmental factors that influence consumer preferences and dietary practices. Define effective techniques for nutrition education among various populations.
3. **Nutritional Quality of Foodstuffs.** Measure the effects of production, processing, and preparation practices on the nutritional quality of food products.
4. **Bioavailability of Nutrients.** Identify interactions among foods, their constituents, and other substances consumed which affect the bioavailability of nutrients. Develop methods for measuring nutrient concentrations in tissue and fluids; relate to long-term health factors.
5. **Health Influences From Diet.** Define the nature and magnitude of health effects associated with certain food components such as lipids, saturated fats, cholesterol, chemical residues, and naturally occurring toxicants.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	100	$31,750	$16,200

Animal Health and Disease

Situation

Animal diseases cost the livestock industry an estimated 20 percent of its annual gross income. These losses must be reduced in order to improve the profitability of livestock agriculture and to improve the quality of the human diet. More than 150 diseases of animals are transmissible to humans, according to the World Health Organization. Control or eradication of these diseases improves and protects human health. With animal production systems being intensified, there is greater need for integrated animal health programs to help assure the stability of these systems. Biotechnology offers unprecedented opportunities to develop new types of diagnostic reagents and safer and more efficacious vaccines.

Research Thrust

To maintain an affordable, safe, and high-quality food supply and to sustain a profitable food animal industry by controlling diseases and developing optimum health management systems for livestock, poultry, and fish.

Objectives

1. **Immunological Advances.** Develop improved immunological techniques for prevention of animal diseases; develop methods for early and rapid detection of diseases and/or organisms contaminating animal products.
2. **Integrated Health Management.** Determine the incidence and economic impact of diseases, evaluate the effectiveness of disease control methods, and define total animal health management systems which address profitability of livestock operations.
3. **Epidemiology of Animal Diseases.** Develop animal disease surveillance programs which will result in cost-effective control and prevention of both domestic and exotic diseases.
4. **Residue and Toxicology Studies.** Elucidate functional and morphologic changes induced by exposure to toxic chemicals and drugs.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	100	$42,500	$18,000

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Food Processing, Safety, and Quality Enhancement

Situation

On average, more than 60 percent of every retail food dollar pays for post-harvest activity, including processing, transportation, storage, preservation, packaging, and marketing. Consumers are demanding improvements in the safety, wholesomeness, nutritional makeup, and convenience of their foodstuffs. In addition, growing environmental concerns are forcing additional expense to be incurred in handling, recycling, and disposing of agricultural wastes and residues. Emerging technologies offer opportunities to substantially improve food quality and safety while reducing the cost of food products.

Research Thrust

To understand the physical, chemical, microbiological, and biological properties and structures of foods and related products, as well as the mechanisms that control biological and microbiological activities. To improve food processing systems and to ensure safe and nutritious food products.

Objectives

1. **Processing and Preservation.** Develop new technologies to improve existing processing methods and develop new food processing and preservation systems. Determine the molecular and structural properties of foods and their effects on processing, packaging, quality, and safety of foods.
2. **Quality Enhancement.** Develop methods to rapidly determine food components. Improve food quality and develop new food products.
3. **Food Safety.** Determine the factors which affect the survival and growth of microorganisms in food systems. Develop rapid and reliable methods for analyzing foods for the presence of pathogenic microorganisms, toxins, and chemical contaminants. Improve food production, handling, processing, preservation, and distribution techniques which affect safety.
4. **By-Products and the Environment.** Determine the properties of process waters and waste. Improve methods of disposal and assess their potential use in value-added by-products, such as fuels or soil amenders. Develop new sanitizing/cleaning agents and methods.

		($ x 1000)	
Resources:	Scientist Years	Start-up Costs	Annual Costs
	100	$42,500	$18,000

Animal Efficiency in Food Production

Situation

Animal products are major sources of many essential nutrients in the human diet. Research is needed to achieve optimum biological efficiency in the production of animal products. Animal protein is a high-quality, complete, balanced protein, but the composition (such as muscle-to-fat ratio) of certain animal products must be altered to improve consumer acceptability in terms of current dietary standards. The quality of animal products for human consumption can be improved by manipulating genetic, physiological, and nutritional processes to optimize feed and forage utilization, and by controlling the cellular mechanisms responsible for the synthesis of animal proteins and lipids.

Research Thrust

To optimize biological efficiency in the production of quality animal products by improving the genetics, physiology, nutrition, health, and management systems of animals.

Objectives

1. **Animal Genetics.** Develop genetic engineering techniques to enhance disease resistance, nutrition, and growth by utilizing genomic insertions and alterations to complement conventional breeding techniques to increase biological efficiency.
2. **Reproductive Physiology.** Improve the control of environmental, disease, and physiological factors that adversely affect estrus, ovulation, fertilization, and embryonic and perinatal survival of young. Develop improved techniques for gamete and embryo multiplication, in vitro fertilization, sexing, storage, and transfer.
3. **Animal Nutrition.** Identify and manipulate factors which increase nutrient availability; develop techniques to manipulate rumen microflora to enhance their utilization of cellulose and starch; identify processes to improve the availability, digestibility, and metabolic interactions of minerals; and define more precise nutrient requirements for animal growth and reproduction under various genetic and environmental conditions.
4. **Animal Protein and Lipid Synthesis.** Identify the mechanisms that control synthesis and degradation of protein and fat in food animals; identify the factors that control muscle and fat cell number; and seek genetic, nutritional, or endocrinological controls over these mechanisms.
5. **Animal Management Systems.** Develop housing and management systems that will reduce animal stress, maintain environmental quality control, and optimize biological efficiency in the production of animal products.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	75	$31,875	$13,500

61

Marketing of Agricultural and Forest Products

Situation

Agricultural and forestry products have value only when provided in a form, time, and place that satisfies consumer demand. One major problem is the limited number of marketing outlets available to U.S. agriculture and forestry, even though both domestic and foreign consumers are increasingly able to purchase more agricultural and forestry products. In order to satisfy both producer and consumer needs simultaneously, new knowledge is required regarding changing technologies, consumer tastes and preferences, and the scope of markets for food, fiber, and forest products. Such new information will guide future production, especially the variety, form, and quality of products. Also, improving the efficiency of processing and distribution operations will lower the costs of these products and improve U.S. agriculture and forestry's market share in world trade.

Research Thrust

To strengthen domestic and international markets for agricultural and forest products by improving the structure and efficiency of markets.

Objectives

1. **Supply, Demand, and Price Relationships.** Analyze domestic and foreign supply, demand, and price relationships for agricultural and forest products.
2. **Grades and Standards.** Improve grades, standards, and other measures of product quality to effectively communicate the value of agricultural and forest products to the consumer.
3. **Market Efficiency and Performance.** Analyze the efficiency and performance of alternative markets to reduce costs, increase consumer satisfaction, and improve transportation systems.
4. **International Market Development.** Develop strategies for penetrating foreign markets to strengthen trade policy and reduce instability in international trade.
5. **Market Strategies and Power.** Analyze the effects of various governmental marketing policies and regulations, and the strategies of producer groups; recommend policy adjustments and actions.
6. **Consumer Preferences and Quality.** Investigate the consumer's expectations, preferences, and acceptance of product characteristics and quality.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	20	$3,000	$2,400

Integrating Agricultural Technologies

Situation

The long-term profitability of farming is affected by technological change, quantity and quality of farm resources, prices of farm inputs and products, policies of financial institutions, and government farm programs. New and alternative technologies, marketing strategies, and institutional arrangements for financing need to be variously integrated as farming system options. Optimal input/output relationships, environmental impacts, market potential, farm and off-farm income, vertical or horizontal integration in production, and marketing are important considerations. From such farming systems, producers can develop individual strategies for long-term adjustments in their operations. The rapidity of adoption of new technologies will have significant impacts on the organization of agricultural systems, farms, and rural communities.

Research Thrust

To develop production and marketing systems that will sustain the long-term productivity and profitability of agricultural operations.

Objectives

1. **Assessment of New Technologies.** Analyze the economic feasibility and potential rates of adoption of emerging biotechnologies and information technologies. Assess the direct, indirect, and interactive impacts — social, economic, and environmental — of emerging technologies.
2. **Market Forces and Enterprise Profitability.** Analyze the effects of various market factors on production costs, commodity prices, and investment capital costs.
3. **Capital Investment and Financial Requirements.** Analyze the costs of adopting new technologies, estimate financial requirements, and identify investment alternatives.
4. **Integrated Systems.** Develop production management/decision models and expert systems that integrate financial arrangements, marketing options, production technologies, resource management practices, and enterprise alternatives for various forest, crop, and animal/fish operations.
5. **Alternative Systems.** Identify input/output relationships, environmental impacts, and market potential of alternative crops, animals, and farming systems.
6. **Optimal Input Systems.** Develop component processes (e.g., nitrogen fixation, cover crops, new crop varieties, fertility management, tillage systems, etc.) to optimize production systems for increased profitability.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	100	$15,000	$12,000

63

Rural Youth, Family, and Community Well-Being

Situation

The well-being of rural families, involved directly and indirectly in agriculture, forestry, and other natural resources, is intrinsically linked to the rural economy and communities. Economic well-being depends on economic diversity, job security, income stability, and resource management skills. For social well-being, families must have access to community organizations and resources that provide support. Physical and environmental well-being are reflected by the quality and access to health care, housing, security, and personal safety on and off the job. How the rural community responds to structural changes depends on its capacity to organize local resources.

Research Thrust

To identify the impact of social, economic, and structural changes on rural families and communities and to strengthen family and community resources to manage change.

Objectives

1. **Economic Alternatives and Diversification.** Identify new alternatives for employment, especially off-farm employment, home-based businesses, alternative agricultural products and enterprises, expansion of the rural service sector, and other economic diversity for family income stability and community growth.
2. **Family Stress Factors.** Analyze group and community responses to individual and family stress resulting from social, economic, and technological changes, and assess their relative effectiveness in mitigating the impact of stress and economic uncertainty.
3. **Displacement Assistance.** Identify types of assistance needed by displaced farm operators, their families, and farm workers to make the transition to non-farm jobs; evaluate the types of programs providing such assistance.
4. **Resource Management.** Improve the skills and abilities of families and communities to manage money, time, human, physical, and community resources.
5. **Environmental and Safety Factors for Families.** Develop products and procedures that protect agricultural workers and farm families from chemical exposure and other production and processing hazards.
6. **Organizing Capacities and Governance of Communities.** Develop strategies to strengthen the organizing ability of rural communities through leadership development; determine delivery systems needed to provide facilities and services for economic development; and identify alternative organizational arrangements and funding mechanisms for governance in rural areas.
7. **Interdependence Among Agriculture, Families, and Communities.** Determine the consequences of structural changes, emerging technologies, and public policies on farm family stability, community growth, and economic diversity.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	50	$7,500	$6,000

64

Impact of National and International Policies on Agricultural and Forestry Markets

Situation

The health and strength of U.S. agriculture and forestry are affected by national and international economic policies. High real interest rates, flexible monetary exchange rates, and the well-integrated international capital market have created a stressful situation for U.S. agriculture and forestry, which are increasingly dependent on foreign trade. Certain monetary and fiscal policies, as well as conditions in international financial markets, can be counterproductive to farm commodity programs that operate by intervening in domestic markets. This is costly to American producers, consumers, and taxpayers. Agricultural policies must be analyzed to take into account the interrelationships between commodity, factor, and financial markets at both national and international levels. In this way, more realistic and beneficial policies and institutions can be developed.

Research Thrust

To develop the research base for agricultural policies and institutions which will improve the performance and profitability of U.S. agriculture and forestry, and strengthen their contributions to overall economic growth.

Objectives

1. **Commodity, Factor, and Financial Market Relationships.** Analyze relationships among commodity, factor, and financial markets at the national and international levels.
2. **Political Economy of Domestic and Foreign Commodity Policy.** Predict each major trading country's policy reactions to commodity and trade policies of other countries/economies.
3. **Comparative Productivity Growth and Competition in World Markets.** Define factors that influence different rates of productivity growth among countries; determine impacts of the absolute and comparative advantage in producing commodities for world markets.
4. **Impacts of Emerging Technological Changes for Public Policy.** Assess the impact and the rate of adaptation of emerging technologies for the development of policy and management options.
5. **Policy and Institutional Design.** Develop policy proposals and institutional designs that improve the performance and profitability within an interdependent world economy.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	50	$7,500	$6,000

65

Agricultural and Forest Land Use

Situation

The expansion of cities and population redistribution into rural areas, especially forested and open agricultural areas, raise issues of land use, land values, state and local policies, property taxes, recreational use, and the impacts of development or preservation on the local economy. The presence of large populations adjacent to forests or rural lands and the increasing tourist and recreational use of such lands has potentially serious impacts on the quality of our recreation resources.

Research Thrust

To analyze the interrelationships of public policy and land values; to examine land use alternatives for development; and to develop strategies for minimizing the impacts of heavy recreational use of agricultural and forest lands.

Objectives

1. **Land Use Policies, Land Values, and Tax Base.** Analyze the effects of land use policies and land values on the property tax base of rural communities, and on the distribution of tax burdens among farmers, landowners, and rural and urban populations.
2. **Land Use Alternatives.** Evaluate opportunities and assess implications of expanding wildlife enterprises and other recreational uses of agricultural, range, and forest lands, and develop land use planning systems for the wildlife/rural/urban interface.
3. **Recreation Resource Management.** Develop management programs for wildlife, vegetation, and recreation resources suited to high density use.
4. **Consolidation of Forest and Agricultural Land Information.** Develop high-quality data bases and information management systems to permit more knowledgeable policy discussions on land use alternatives.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	70	$15,750	$10,500

Energy Efficient Systems

Situation

Modern agriculture is highly energy intensive, depending heavily on hydrocarbons for fuel, fertilizer, and pesticides. Moderation in petroleum prices and adequacy of current supplies have lessened the urgency to reduce agriculture's dependence on petrochemicals. Yet, chemicals and energy are major cost factors affecting the profitability of agricultural and forestry enterprises. Research is needed to determine our ability to improve economic efficiency while maintaining the quality of our natural resource base.

Research Thrust

To develop energy-efficient production and processing systems for agriculture and forestry using new and emerging technologies and to develop the knowledge and design bases for energy conversion and production from agricultural products and waste.

Objectives

1. **Efficient Plant and Animal Production and Processing Systems.** Develop and assess efficient systems for production, harvesting, processing, and transporting products from croplands, forests, and rangelands.
2. **Efficient Energy Conversion Technologies.** Develop environmentally benign processes to convert biomass from agricultural and forestry enterprises to liquid and gaseous fuels for both on- and off-farm uses.
3. **Alternative Sources.** Develop an understanding of alternative energy conversion technologies with the goal of producing an environmentally benign and efficient process for utilizing alternative energy sources in agriculture.
4. **Extraction Procedures and Practices.** Evaluate systems for extracting energy minerals with respect to controlling and/or reducing atmospheric pollutants; develop improved methods for rehabilitating lands disturbed by mining.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	20	$5,400	$3,060

Forest Productivity

Situation

Global demand for wood and wood products is projected to increase threefold by the year 2030. Similar projections have been made with regard to alternate uses of forests such as tourism, recreation, and wildlife. The future of the U.S. forest resource base will depend upon improving our domestic and international competitiveness while maintaining the health and vitality of forest resources for long-term production and conserving their multiuse values. Intensified research efforts are critical if new opportunities in science and technology are to be used to improve the productivity and profitability of the forest resource base while minimizing the potential adverse environmental and social effects of such management and use.

Research Thrust

To increase the productivity and profitability of the forest resource base by improving silvicultural practices, developing new products, and developing marketing strategies that will expand domestic and international markets, while maintaining other multiuse values.

Objectives

1. **Silvicultural Techniques and Practices.** Develop integrated, site-specific management systems that maximize fiber yields and reduce costs while maintaining site productivity. Develop equipment and harvesting systems that will permit economical recovery of all sizes and species of forest biomass. Identify the interactive effects of harvesting systems on soil mechanics, nutrient cycling, regeneration, soil erosion, and water quality.
2. **Genetics and Superior Tree Production.** Apply biotechnology and genetic diversity to increase forest productivity, control pests and diseases, and develop new products.
3. **New Processes, Products, and Uses for Wood.** Determine how selection, breeding, and silvicultural practices influence wood properties and composition; identify the mechanisms that control the internal bonding of wood and wood components; expand present knowledge of fluid movement in wood; and discover new principles for enzymatic, microbial, and chemical conversions of wood to chemicals. Develop new products from and uses for forest biomass.
4. **Forest Health.** Study the effects of acid precipitation and other gaseous pollutants on forest growth and health. Develop principles and methods for appraising the fire, disease, and insect damage potential of forests and other renewable natural resources and for evaluating the economic efficiency of alternate programs designed to prevent these losses.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	45	$12,875	$7,650

Productivity of Range and Pastureland

Situation

Rangelands and pasturelands comprise more than 70 percent of the land area of the United States. These grazing lands provide water, wildlife, scenic beauty, and recreation, in addition to feed for livestock. In some areas of the South and Southwest, net income from recreational uses exceeds that from livestock. Water conservation and yields in many aquifers could not be sustained without the vegetative cover of rangelands and pasturelands. Humid grasslands have unexploited potential as a source of feed for grazing livestock and wildlife, and for mechanical harvesting. The use of more efficient production systems on marginal and erosive lands could make grazing or forage production competitive with crop production, and reduce the likelihood of serious soil erosion. Despite the potential for increased productivity of pasturelands and rangelands, the technology for managing these lands lags far behind that used in more traditional agricultural systems. Innovative vegetation and animal management systems can significantly increase the production efficiency on U.S. rangelands and pasturelands.

Research Thrust

To develop improved and profitable multiuse management systems for rangelands, native pastures, and humid grazing lands.

Objectives

1. **Rangeland Ecology and Management.** Identify and develop an understanding of biological and ecological concepts applicable to multiuse management of rangelands and pasturelands; develop information systems and decision models for users of these lands.
2. **Plant/Animal Interactions.** Determine the effects of both domestic and wild grazing animals on the morphological development and physiological functions of range and pasture plants as well as plant communities.
3. **Water Management.** Analyze the various uses of range and pasturelands with respect to impact on water balance and erosion control.
4. **Plant Improvement.** Develop biologically efficient herbaceous or woody species to improve forage production, wildlife habitat, and soil and water conservation on range and pasturelands.
5. **Weed and Brush Management.** Develop reliable, economical, and safe methods of managing unwanted plants on range and pasturelands to improve production, reduce erosion, and reduce animal death from poisonous plants.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	50	$7,500	$6,000

69

Effects of Atmospheric Deposition on Ecosystems

Situation

Many industrial and other processes are contributing to changes in the chemistry of the atmosphere. The effects of these changes are major scientific and policy issues in many parts of the United States and the world. Increased research is needed to determine if, when, where, and to what extent airborne chemicals are changing the productivity and quality of surface waters, forests, plants, and animals, including fish and wildlife. The results can provide a basis for developing alternative management strategies, and can guide the development of public policy.

Research Thrust

To determine the beneficial and/or harmful effects of airborne chemicals on the health and productivity of crops, forests, animals, including fish and wildlife, and associated ecosystems.

Objectives

1. **Chemical Exposures.** Determine the chemical compositions of rain and snow and the dry deposition of airborne chemicals throughout the United States to pinpoint areas of greatest risk under ambient conditions.
2. **Amount-Response Relationships.** Determine the response of crops, turf, ornamentals, and trees to variable amounts and frequencies of impingement of major pollutants; the short- and long-term effects of exposure on biological processes; and pollutant-stress relationships. Develop genetic and cultural practices for mitigating the harmful effects of air pollutants.
3. **Accumulation of Toxicants in Plants and Animals.** Determine if, when, where, and at what levels certain toxic metals and other biologically active airborne chemicals accumulate in plants and animals, including fish and wildlife.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	20	$4,600	$2,790

70

Sensors and Computing Systems for Food and Agriculture

Situation

Lack of adequate sensor technology is the most frequent limiting factor in the application and integration of electronics, computers, robotics, and expert systems in food and agriculture. Sensors are not currently available for effectively measuring important variables such as soil moisture, plant growth, animal health, animal performance, moisture content of flowing grain, and rheological properties of food products. Adequate control and management of a production or processing unit depends on sensing variables simultaneously and, through computing technologies, using the results to make an appropriate decision. Sensors are important to realizing the potential benefits of computer and robotic systems in agriculture. Improved electronic and computing systems can help operators take more precise actions, resulting in greater output, more efficient use of energy and material resources, a safer workplace for human operators, and increased economic competitiveness. The complexity of crop, forestry, and animal production systems, crop rotation, pest management, irrigation, fertilization, chemical management, quality control, and marketing can be overcome with decision-making software packages.

Research Thrust

To integrate electronic sensors, computer hardware and software, robotics, and equipment into electronic control systems that will aid in the management and control of processes in agricultural and forest production, food processing, data management, and marketing decisions.

Objectives

1. **Sensor Technology Development.** Determine the quantitative relationships between biophysical properties and measurable properties. Develop sensors that measure the state of biological materials and then integrate the sensors into electronic systems for controlling agricultural operations.
2. **Electronic Systems for Plant and Animal Production.** Develop and integrate sensors with computing technologies, including robotics, to measure and control plant and animal systems.
3. **Electronic Systems for Food Processing.** Develop sensors and computing systems to measure and control product quality and other variables involved in food processing.

		($ x 1000)	
Resources:	Scientist Years	Start-up Costs	Annual Costs
	75	$31,875	$13,500

71

Plants for the Urban Environment

Situation

The production of plants used in the urban environment is a rapidly expanding area of agriculture in the United States. The economic impact of this new segment of production agriculture is greater than that of many other horticultural and row crops. Through new research, much of the general knowledge developed for the production of food and fiber can be effectively transferred to the agriculture that supports the use of plants in the urban environment. These plant materials can be used to enhance the aesthetic value and alter the microenvironments of homes, workplaces, urban landscapes, and recreational areas. These modifications contribute to a sense of personal well-being among urban populations.

Research Thrust

To identify, select, and propagate plant materials and to manage, maintain, and use these plants in creative interior and exterior environmental designs.

Objectives

1. **Plant Materials.** Develop superior plant materials for urban environments, including low maintenance plant types with reduced fertility and water requirements and plants with increased tolerance to environmental stresses.
2. **Management and Maintenance Strategies.** Develop improved management and maintenance strategies for ornamentals and turfgrasses to control insects, weeds, nematodes, and disease problems and to reduce the use of fertilizers and pesticides in populous areas.

Resources:		($ x 1000)	
	Scientist Years	Start-up Costs	Annual Costs
	50	$7,500	$6,000

Senator **Daschle**. Thank you, Dr. Clarke. I appreciate your comments and those that you provided for us as well, Chuck.

I am going to ask Senator Kerrey if he has any questions or remarks at this time.

Senator **Kerrey**. Actually I hear a conflict that seems to me not to be a new one. It seems to be present as well outside of agriculture and in other economic areas. And the conflict is do we use research to improve our competitive position? In other words, is the purpose of research to reduce the unit cost of the things that we are producing so as to be more competitive in a world marketplace, to keep our costs down, and to be more profitable, or is there a qualitative aspect to the research?

Are we trying to make our lives better? We know that it is possible for us to add technology to our lives and to have something done faster and not necessarily to have it better done. As a result our life is not necessarily improved.

Let me give you a nonagricultural example that is not quite as provocative as some that I would like to actually hear you discuss, and particularly you, Dr. Clarke, as you look down the pathway of research and attempt to weigh the qualitative considerations as well as the quantitative considerations.

In the 1950's it was relatively common to find people saying that we are going to use medicinal agents that are going to improve our lives because we have been told that taking this medicinal agent is going to make us well.

I am very much familiar with this because I was a practicing pharmacist up until the time I got a free physical exam by the U.S. Navy and went off and did that for awhile. The science had reached a point in 1965 that the most rapidly moving pharmaceutical was Dexedrine. We would follow with a pretty large amount of Seconal or phenobarbital or something, some other sedative in order to get individuals to sleep at night after they had taken three or four Dexedrine in order to lose weight.

We were applying technology. And we applied it with such diligence that in the end we did not make ourselves healthier at all. We might have made it easier to lose weight. From a quantitative standpoint we were successful. From a qualitative standpoint it was counterproductive. We did not make our lives better at all.

There are comparable examples in materials, comparable examples in other areas where the application of technology was done without sufficient consideration as to what the world was going to be like when we were all through. Chuck, there is one part of your testimony that talks about the disappearance of the middle class in rural America.

And I am very much aware of that. I am very much concerned about this dividing into the haves and have-nots that we are seeing even in rural America. And I am wondering if you see a connection between research and this kind of division? That is a specific qualitative analysis as far as our society is concerned.

Do you see a connection between research and this trend? And Dr. Clarke, I am trying to get a sense from you as you try to plan this research whether you have any qualitative objectives that you consider?

Mr. **Hassebrook**. I do think there is a connection, and I think to respond to your broader point, I think that in a sense agricultural research is a form of social planning, in that the choices we make about what research we undertake and what technologies we develop, what farming systems we refine, are ultimately going to have a big impact on which ones are put to use and they will in turn shape our communities. They will shape agriculture and they will shape life in rural America.

I think that the growing disappearance of a middle class in rural America does, in fact, reflect some of the research directions we have seen in the past. We have taken an industrial approach to agriculture. We have focused on improving efficiency by reducing the role of people in agriculture, quantitatively and qualitatively. We've tried to reduce the amount of time that people have to spend farming, but we have also reduced the sophistication of labor so that it would be possible to get the farm work done by unskilled employees, low-paid people without a lot of skills, and segregate the management into the office.

That allowed farms that had less labor involved, but also a type of a labor that could be done by poorly paid employees. So I think that type of research aimed at improving or lowering unit cost by reducing the role of people in agriculture leads directly to that disappearance of a middle class, and I do not think that is necessary.

There are ways that we can pursue efficiency that do not do that. We need to pursue efficiency by enhancing the role of people in agriculture, creating opportunities for people to use their skills and their management to reduce input costs.

Biotechnology provides an example that we have to get a good handle on. I fear that for the most part we are using biotechnology much the same way that we have used chemicals, to reduce the role of people in agriculture. We are using it to override natural systems so that we can, for example, have monocrop systems like continuous corn, and then have a biological product instead of a chemical product to deal with the specific pests that crop up when you grow something like continuous corn instead of using it in other ways to look at how we might gain a better understanding of natural systems so that we can farm in ways that avoid those problems so we do not need those products.

We should also look at how we can use biotechnology to create better opportunities for people to use their time and skills in agriculture and make a living at it. So I think it is very important that we get a handle on that. We certainly have to look at research as a means of improving efficiency and competitiveness. But that is not enough.

I would also say it cannot be segmented. We cannot say we are going to do some research to advance efficiency, and then we are going to have a category of research for the environment, and a category of research for rural communities. It must be put together because if, on one hand the research we do in plant productivity or animal productivity is causing the elimination of a middle class in rural America and then we try to do some rural development research to reverse that, they are going to be at odds with each other.

We need to avoid segmenting them and instead aim the whole research program at advancing a broad set of goals.

Dr. **Clarke**. The question of qualitative versus quantitative, I believe, focuses our attention on to a very critical part of the planning process. My perception is that we began back probably in the mid-1970's and have continued to accelerate the recognition that people at the individual scientist level have of the distinction that you are making, Senator, about the quality of the product as opposed perhaps to the quantity that is produced and the unit cost of production.

I do not believe that these ultimately wind up as being totally separated from one another in the marketplace, but as we look at our agenda today, we in agriculture, not the research community, but agriculture in general, simply have to recognize that agriculture today will be quite a bit more consumer driven than it ever has been before.

The consumer is concerned about several parts of the food and fiber production system. They are making their concerns known in the marketplace. We see in the recent situation with Alar and apples the demonstration of the consumer's ability to drive what is going on in the marketplace.

A very contemporary example for those of us in my State is the situation with regard to lean beef. In a matter of several months, we went from a product that was sold in the marketplace with one-quarter to three-quarters of inch of fat on it to a situation today where we are a very short ways away from having fat cattle slaughtered and a process called hot trim done to take the excess fat off and then we are going to weigh the cattle after that and pay the feedlot man on the basis of the trimmed carcass rather than the total carcass.

And we are going to have a major impact, we believe, on the total system of beef production all the way back to the cow-calf operation, through that concern that is essentially consumer driven. The consumer is concerned about all sorts of additives. They are concerned about nutritive quality, and they are concerned about health.

Those kind of quality issues are going to drive agricultural research all the way from the most fundamental consideration of plant and animal genetics to production practices and feeding practices. To say that it is addressing the quality issue rather than the quantity issue, I think is a fair thing to say, but it is also reasonable to assume that in the process of doing that, one is going to introduce another kind of dimension to the marketplace where farmers and ranchers are going to ultimately be paid for that quality enhancement that is undertaken.

Senator **Kerrey**. If you take a 40-year period of time from 1948 to 1988, and you, I am sure, Dr. Clarke, know this far better than I do, you had a substantial application of technology occurring in each one of those 10-year periods. We went from almost no chemical application prior to 1948 to a point where today there is enormous chemical application, from a very crude transportation system in 1948 to a very sophisticated transportation system, and from almost no communication technology to computers, television, telephones, and so on. Power application is much more sophisticated than it was.

There are all sorts of technological applications that have occurred in that 40-year period. What I would ask you is, without offending you by assuming that you remember what life was like in 1948, have we improved things? Is life in rural America better in 1988 than it was in 1948? I mean better in the way that you and I would measure it if we were sitting around and talking about whether the world is better now.

I don't mean are we making more money, are we selling more product, but have we made life in rural America better over that 40-year period of time?

Dr. CLARKE. I would answer unequivocally that we have.

Senator KERREY. Have we made it worse in some way?

Dr. CLARKE. In some areas that Chuck has talked about, I think you have some serious concerns about the viability of rural communities, but the overall, I guess the overall question that I would counter with is have we made life better in the United States for the total citizenry? And there I think that the products of agricultural research and what production agriculture has done with it have unequivocally given us an improved food supply, a safer food supply, more nutritious food supply, and one that costs relatively little.

That system certainly has placed pressure on the structure of agriculture, and that changing structure began, in my judgment, well before 1948. That change in structure of agriculture began probably in 1918, and has moved in a direction, and certainly in a direction of consolidation and increasing size at the expense of the rural community. There are obviously opportunities to modify the process that is going on there, and I think that is the thrust of some of the good comments that are coming from Chuck. But I see that in the context of a total agenda.

Senator KERREY. Yes. I am, by the way, not suggesting that we have not made substantial qualitative progress. I think that we have. But I think that there are a number of instances where rural America has not been altogether improved. When you plan for the future, do you attempt to look at some of the bad things where we simply did not ask the right questions about how this technology is going to affect us?

I do not think that technology should be applied without some consideration of where it is going to take us. I think we have clearly done that with a number of our technologies. We would just as soon assume that since it is newer it is going to be better. This is not just a problem in agriculture. It is a problem in all sorts of other areas of American life, and I am just trying to get some sense of how you factor in what this world is going to look like 40 years from now if we apply this technology.

Dr. CLARKE. I believe the area you are talking about, in terms of looking ahead at the impact of new research, is one that is very challenging. It is challenging from a number of standpoints that I know you are aware of.

It is hard to look 40 years ahead. It is hard to look very clearly 10 years ahead in terms of the kind of technology developments that are occurring, both inside and outside of agriculture, to know what is going to be possible. One of the things that is characteristic of our system of the development of science and technology today is that we are not going to orchestrate that by modifying the farm bill. We are going to have the ability to influence it quite a bit, but the basic technology that is emerging in a broad scale, across all of science, is going to have a substantial potential for impacting agriculture, is one that has a pace and a drive of its own.

And those kind of opportunities and options will emerge and have to do with the agenda downstream. How we use those technologies, how we apply them, it seems to me, we have quite a bit more ability to influence.

Let me take back just a little more of a personal observation if I may. The standard plant breeder that operates in our Experiment Station today has only just begun to think about the qualitative issues that you are talking about, Senator, as being a dominant feature of that agenda. That plant breeder was trained from square one to think about the enhancing yields and increasing total production as being the most substantial measure of merit that existed in his individual strategy.

And it is at that level of the individual scientist that we ultimately have to introduce the sense of responsibility that you are talking about in terms of changing the agenda. I believe that sense of awareness about the changing agenda has essentially emerged from the top down, has come through these kinds of interactions and is beginning to be manifest at the local level.

And it is for that reason that I come back again to my earlier statement. I believe it is very important for the interaction between scientist and people who are concerned to occur at the lowest possible level so that those people understand the agenda.

But in the last half of the 1980's, the agenda of the Experiment Stations and the agenda of the Joint Council has shifted very substantially into recognizing the diet health issues, the environmental issues, and the issues associated with rural communities much more than they did in the first half of the 1980's. So I would submit that the system is recognizing the changing agenda, and that hopefully we will be in the process of reacting. We think we are in the process of reacting to it.

Mr. HASSEBROOK. If I could, I would just say that I think that technology is less self-directing that sometimes presumed. When I look at biotechnology, there are many different ways biotechnology could be used. We face a myriad of choices about how we use that. We could use it to gain a better understanding of how microbial life in the soil would be affected by changes in farming practices. There is very little use of it that way.

We see the primary use of biotechnology aimed at finding ways to develop new products to sell to farmers. And in some cases, I do not deny that that is appropriate, but I do not think it should be the principle thrust of that research. Those are choices made by people.

They are choices made by institutions, and we have a lot of control over what direction technology takes by where we put our research dollars, and I think we need to use that consciously and well.

Dr. **Clarke**. I agree with what Chuck is saying, and I think it is an interesting, still another dimension to the modern discussion of agricultural research today, and that is let us take the biotechnology issue, and talk about the investment that industry is going to make in biotechnology, and industry is going to invest in precisely the way that Chuck has said. They are going to invest in the development of products that they can make a profit on, and they are not going to invest in other aspects of it.

It is my feeling that we have a very healthy relationship between academic institutions and State and federally supported institutions, and those in industry in the area of biotechnology. If we take our principal thrust in the area of those kinds of new technologies that are going to be broadly serving, and that are going to provide capabilities that will not necessarily result in the selling of a profitable product year after year.

If we develop varieties of new plants or breeds of new animals that can be essentially taken to the public domain, the future use of those kinds of products is not going to be anymore expensive than the use of existing products, and if industry comes along and develops a special kind of new product that can be resold each year to farmers, then they are going to make a profit on that, and if they do make a profit, it is going to be probably because it serves a useful function to the industry.

But my point is that there is a fairly broad agenda in the new science that is going to be very helpful to society and to agricultural producers and processors that is probably not going to be making a major profit every year and will probably be in the open use arena.

Senator **Daschle**. The impression I have, Dr. Clarke, is that no one really makes, from a national perspective, no one really makes decisions with regard to the priority on research. That it is made in sort of a composite fashion at the local level, as you say, but to a large extent by an evolution really in the relationship that comes from companies that work in research with institutions.

And my sense is that there is probably more conflict than we have probably talked about this morning with regard to the goals of individuals and companies in product development research and those in the public interest where you might have a lot more focus on public related research and development. I cannot sort that out yet. But if I were a land-grant university and I had the opportunity for matching funds for $1 million, let us say, by some company to develop a product, biotechnology related product, I would probably do it.

I would want to make sure that my researchers were well financed. I would want to make sure I had my laboratories full. It would not be "is this in the best interest of the public good in the next 20 years?" It would be "how do I keep my researchers occupied?" How do I draw some attention to what we are doing and stay sort of at the cutting edge of biotechnological research without a lot of—I mean no one is there overlooking this thing saying "is this in our best interests or not." It is driven by an economic concern about the impact that that money will have at the local level.

Dr. **Clarke**. I certainly understand your concern. I believe there is a solid basis for having some concern in that area. The give and take and the evaluative process in State supported and federally supported institutions like the one I come from is one that is ongoing at the local level.

It is one that deals with a set of clientele that are very much concerned about what we do and how we do it. And I also believe that we are more vulnerable to the kind of concern that you expressed as we see that balance shift further and further away from State and Federal funds into the mixture into the State and Federal and private funds that come to the agenda.

I am not sure what the percentage is. Our institution today, derives about 30 percent of its annual budget from external grants including Federal funds, not in the formula driven area.

Senator **Daschle**. Thirty percent is Federal. How much——

Dr. **Clarke**. No, I am sorry. Thirty percent is external not including Hatch or McIntire standards, competitive external funds.

Senator **Daschle**. I see.

Dr. **Clarke**. Of that 30 percent, between 15 and 20 percent of that 30 percent comes from industry. We would contend that we are still dominated very substantially by the agenda that involves State appropriations, Federal Hatch and McIntire-Stennis and Evans-Allen's appropriations and the agenda that is being set through USDA and other kinds of competitive grants.

Senator **Daschle**. So you are saying out of the 30 percent, 30 percent of that, in other words one-ninth of your entire budget, would be privately——

Dr. **Clarke**. That is right.

Senator **Daschle** [continuing]. Funded sort of product development kinds of contracts?

Dr. **Clarke**. Yes. And my point, I guess, is that if you are in that position, you can afford to make sure that you take on those kinds of issues with industry that fit the strategic plan.

Senator **Daschle**. Is that representative of most institutions?

Dr. **Clarke**. I would say that we may get a few more dollars percentagewise from external sources than the smaller States do, but there are quite a few States that will get a larger number of competitive dollars from the Federal Government in the nonformula area as well as with industry.

Senator **Daschle**. Chuck.

Mr. **Hassebrook**. I would just say that the fact that 10 percent of the money may come from private sources and 90 percent from public does not mean that the private money is not influential in determining research directions. In fact, I think in many cases what happens is that 10 percent ends up being the tail that wags the dog. The public provides the institution, the facility, the researcher and a private company comes along with a little bit of icing on the cake to buy——

Senator **Daschle**. How does that happen, Chuck? How does the tail wag the dog with 10 percent of the funds?

Mr. **Hassebrook**. Well, because the investment in the institution and the researcher is there and the researcher knows it is there; he does not have to worry about that. He has the institutional base and his salary is largely paid by the public. But if he wants to get money to get a research assistant, to get some of the types of maybe research tools he needs, what have you, he has to find that money elsewhere.

He can get a grant from a private company to provide that extra money, but he may have to do the kind of research they want to get that extra money. So the problem is that 10 percent is coming with more strings attached than the 90 percent that comes from the public, and so we allow that 10 percent to be the tail that wags the dog.

Senator **Daschle**. Does the tail wag the dog, Mr. Clarke?

Dr. **Clarke**. In some cases. I think that is a matter of management.

Senator **Daschle**. In the majority of cases?

Dr. **Clarke**. No, I do not believe so. But I do know what Chuck is talking about. I have seen it in our own institution. It is a matter that I work on on a continuing basis to review those kind of agreements to make sure that we are, in fact, first of all engaged in a two-way street. In our place, we are relatively uninterested in simply evaluating the products from industry on a regional basis, but we are interested in making sure that we are going to learn something in research mode that is fundamentally important and that fits our own set of missions and goals.

And I come back again to the importance of adequate strategic planning so that researchers as well as administrators within this broad system understand what the overall motivations are, and try to make sure that when we take external funds that they fit into the general mode of our strategic plan.

If we are squeezed down to the point where there are not any other sources of funds available, we begin to see that kind of shifting in terms of what kind of money you take in, not only at the level of the individual researcher, but you see that shift begin to occur institutionally as well. It is that need to maintain a sufficient quantity of total resource in the area that can let you drive the overall program in the direction of the strategic plan that is the area that I have the major motivation to try to achieve.

Senator **Daschle**. How do we, as a matter of public policy, try to attempt more successfully to preclude the tail wagging the dog? What can you do?

Mr. **Hassebrook**. I think the first step is that the public needs to provide stronger strings. That is maybe the most important step. If in fact, there are clear directives from Congress about what it is that you expect out of your investment in publicly funded agricultural research, I think that as much as anything will make it more difficult for the 10 percent to wag the 90. And that includes some clear procedures that ensure that those goals and purposes are more than just pieces of paper gathering dust, but are in fact, reflected in the priority setting process.

Senator **Daschle**. Dr. Clarke, before you go any further, would you support more restrictions, tighter control over public funds to ensure that the tail does not wag the dog?

Dr. **Clarke**. No, I would not, not in the form of——

Senator **Daschle**. What is your solution then? You said you do not think it is a majority of cases, but you led me to believe at least with your answer that it happens to a significant degree that the tail wags the dog.

Dr. CLARKE. It happens occasionally, I think.

Senator DASCHLE. What would be your solution to solving that problem?

Dr. CLARKE. Well, I am not sure that I would, I am not sure that I want to leave you with the impression that I think that there is a major problem to be solved there because I do not. I think the system that we are operating in is always going to be less than perfect because it is such a diversified and decentralized kind of a system. That kind of activity is going to be, the merits of that are going to need to be judged on an individual basis at individual States and probably within individual locations.

Very frankly, we are not at war with the industries that provide inputs to agriculture. We are involved in many cases in helping them evaluate the utility of their products at site specific areas and that is the only way that that can be effectively done. And we are not concerned or ashamed of that relationship that exists with industry and I hope will continue to exist with industry where there is a partnering occurring.

Senator DASCHLE. Are you talking about yourself or are you talking generically?

Dr. CLARKE. No, sir. I believe that would pertain to the State Agricultural Experiment Station system broadly. There is a rich engagement with industry.

You asked if there is a possibility that that is misused from time to time in the context of what Chuck said, and I did say to you that I believe that is the case. I believe that we occasionally take that marginal few bucks on the side that enables the researcher to achieve what he wants to do, and he has to do something for an industry that maybe if the world was perfect he would not do.

But I make that to be a relatively minor concern, and I would certainly not want to impose on the entire system a major new set of bureaucratic procedures and loops to jump through that would require people to report individual projects and be concerned at that level.

I would definitely support the kind of statement that I believe you made earlier this morning or perhaps it was Chuck, that we need to look at this in the aggregate, that we need to sharpen our ability in terms of analysis to evaluate the nature of that series of interactions to look at both the positive and the potentially negative aspects of it.

But I would do that in an analytical sense, and I would certainly not recommend to you that this could be regulated or legislated because I do not believe that it can be done.

Senator DASCHLE. Chuck, have you had a chance to see the research initiative priority listing 1 through 21?

Mr. HASSEBROOK. I do not believe I have seen that document.

Senator DASCHLE. I have no way within which to judge this—I assume that No. 1 is more important than No. 2, which is more important all the way through; is that it?

Dr. CLARKE. Yes, sir. That is input to the Joint Council process, and in that situation there is an implication of rank ordering there. Our feeling, though, is that to make the top 20 means that we think that this is a set of agendas that need to be undertaken, and we select from a series of about 150, the top 20, to come forward with.

So I would like to convey a sense of substantial importance to all 20 of these, but we do rank order them, and as I said to you earlier, the first five or six that you see there certainly show the broadest area of consensus that we have about priority. We are seeing a fair amount of dynamics in that shifting priorities, as we go along.

Senator DASCHLE. The priority does not seem to jive with the funding, though, and I am curious about that. You have number, let us say No. 3, "Improved Management of Crop Pests and Diseases" at $11 million.[1] But then you have No. 9, "Food Processing, Safety, and Quality Enhancement," $42 million.[2] I am not sure what significance being No. 3 would have if it does not reflect additional funding?

Dr. CLARKE. It does. The costing of these initiatives takes into account a number of factors, and one of them that is important to your particular question is what are we investing today relative to what we need. And in the particular case, we are investing rather substantially in No. 3, but we are identifying some specific areas that need to be enhanced.

And the one that deals with processing, it is the perception of our community that we are substantially underinvesting very broadly in the research that would allow us to add value to raw products and to decrease the imports and enhance our ability to export higher value.

Senator DASCHLE. So by having higher ranking, you are calling attention to the fact that in some cases it is probably underfunded?

Dr. CLARKE. Yes, sir. In all of these, we are identifying new funds that are needed, but when we rank them we are ranking the subject matter and its importance. First of all, these tend to be outcome oriented statements of need. They say, you know, this is the product of research that is needed. Biotechnology is an exception to that because it is a unique situation, but generally these are outcome oriented statements, and they are intended to be prioritized in terms of the degree of need rather than to the amount of new resources needed.

Senator DASCHLE. I am glad to hear that to a certain extent. You have as No. 13, "Rural Youth, Family and Community Well-Being," [3] which I think in some ways almost ought to be No. 1, as I look at what is happening in rural America today, and that is at the same funding level as "Plants for an Urban Environment." [4] You know obviously somebody has made the decision that they are about equal with regard to the investment from a public point of view we have to be making, and there ought not be any comparison between the two.

There is a lot more emphasis that needs to be put on the quality of life in rural America—this is something Senator Kerrey was talking about—than we do on what kinds of plants you can grow in your backyard.

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[1] See pages 40 and 53.
[2] See pages 40 and 59.
[3] See pages 40 and 63.
[4] See pages 40 and 71.

Dr. **Clarke**. Well, if I may briefly address that. I do not want to be defensive about ornamentals, but in my State the ornamental industry has a larger economic impact, quite a lot larger impact than sorghum, and we grow more sorghum in Texas than we do in any other State. You know the ornamental industry is a new brand of agriculture. It is a very exciting brand of agriculture.

If we are interested in rural development today, the ornamental industry probably offers one of the most exciting ways of bringing new employment. It is a labor intensive industry, new opportunities for small farmers. It is a very small acreage and small investment kind of an industry. So the ornamental industry, while it sounds frivolous on the surface, is one of the fastest growing and one of the most interesting opportunities in agriculture today to do a lot of the things that we have been talking about this morning.

And it is very interesting that the process that we are engaged in today in priority setting process deals with the issues that you bring up of rural youth, family and community well-being that deals with those in a way that still puzzles me a bit as a student of that process.

There is an element of looking at that and saying what is researchable about that. What can we specifically do in research to make a difference? And another—I guess sort of retrospective assessment of this is what have we been able to do with a research investment in the past, and there is a concern about how to develop a researchable agenda, an agenda that we can make a difference with in that area.

I believe if we had that clear, a better perception of what we could do in this area, that the priority system would shift substantially upward. It is a tough problem, and there are some tough problems that some of us really have not been able to see how to make a difference on.

Senator **Daschle**. Chuck, do you have any comments about the prioritization you see here?

Mr. **Hassebrook**. Yes. I guess one of the things that concerns me when I look at No. 1, we talk about, "Maintain and Protect Water Quality and Quantity" and No. 13 you had mentioned, "Rural Youth, Family, and Community Well-Being," my concern is that when we look at items 2, 3 and 4, "Biotechnology," "Improved Management of Crop Pests and Diseases" and "Genetic Improvement of Economically Important Plants," [5] that the research under 2, 3 and 4 will probably have more impact, I would guess, in the long-run on water quality and rural community life and well-being than the research under each of those initiatives. Because those are the types of research that are going to shape how we farm.

It is most important that we not just say we are going to have an area of research where we look at how chemicals move through soil or we look at how we can better do rural development, but that when we do biotechnology or do management of crop pests or do plant breeding that we do it in ways that enhance the rural community, enhance opportunity in agriculture, and enhance the environment. They have to be integrated and they cannot be done separately or they will work against each other.

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[5] See contents page 40.

Dr. **CLARKE**. I really strongly agree with what Chuck is saying. I believe that the first several agenda items there have a far better opportunity of impacting rural communities than the item that we call 13, which if you glance at the substance of that, over on page 23 [printed page 63], it is really looking at rural community institutions and that sort of thing, and it is not talking so much about enhancing the economic well-being of those communities. So I sure agree with what he is saying.

Senator **DASCHLE**. Well, we have to move on to our next panel. I want to thank both of you for your excellent statements, your testimony, the comments that you have given us. I can imagine that before it is over with, we may be calling you back at least for some additional questions, and I appreciate that.

Dr. **CLARKE**. Thank you. I hope you will.

Senator **DASCHLE**. I thank you both.

Mr. **HASSEBROOK**. Thank you, Senator. I enjoyed it.

Senator **DASCHLE**. Our next two witnesses include Michael Dunn, the legislative director of the National Farmers Union, and Susan Bright, a farmer who is a member of the National Save the Family Farm Coalition from Centerville, Indiana.

Susan, I think we will begin with you.

STATEMENT OF SUSAN BRIGHT, INDIANA FARMER, NATIONAL SAVE THE FAMILY FARM COALITION, CENTERVILLE, IN

Ms. **BRIGHT**. Oh, dear. I have only been in D.C. about an hour. You have my statement.

Senator **DASCHLE**. Yes.

Ms. **BRIGHT**. And also we submitted a statement from the Dakota Rural Action. So I just wanted to bring that to your attention. Would it be out of line for me to answer some of the questions or comment on some of the questions you asked the previous panel?

Senator **DASCHLE**. No, go ahead.

Ms. **BRIGHT**. It kind of fits in with my statement.

Senator **DASCHLE**. Well, the entire prepared statement will be inserted in the record as is always the case, so do not worry about that.

Ms. **BRIGHT**. Right. I would rather not just read it to you. I figured you could probably read.

Senator **DASCHLE**. No, if you want, we will just pick up right where we left off with the last witnesses.

Ms. **BRIGHT**. There are just several things I want to comment on. You asked if life is better today than it was 40 years ago. I think that is sort of a myth.

Senator **DASCHLE**. That it is better?

LIFE IS BETTER TODAY THAN IT WAS 40 YEARS AGO IS A MYTH

Ms. **BRIGHT**. No, I think it is a myth that it is better. I do not really necessarily think it is. And I just wanted to say some things about that if that was all right in that I grew up on a farm. My husband and I do now farm, so I think I can make a pretty good comparison. My children go to the same school that I did.

My mother had a washing machine. My washing machine does the same job hers did. It just costs a lot more. It has a lot more dials on it. But it does the same job. So is my washing machine better than hers? I do not think so.

Senator **Daschle**. Well, wait a minute. Wait a minute. You mean to tell me you do not save some time and it does not take less space and——

Ms. **Bright**. Oh, my washing machine is an automatic. It takes about the same space as the one she had. You know I am just saying that I just do not think those extra features necessarily mean that it is so much better, and then it costs so much. When my washing machine breaks down, I am desperate. I have three dirty kids. And so I have to replace it. And I do not always have $300, $400 to go out and replace it. So I think that is just one thing I wanted to mention.

Senator **Daschle**. I think the point is that the quality of life has not been improved substantially by the modernization of machines.

Ms. **Bright**. Exactly.

Senator **Daschle**. Is that what you are saying?

WE HAVE TO COME UP WITH SO MUCH MORE MONEY TO DO JUST SOME OF THESE BASIC THINGS

Ms. **Bright**. That is exactly what I am saying. And the fact that we have to come up with so much more money to do just some of these basic things I think is a real problem, and we have seen this in the farm sector, and we have gone through this credit crisis that we are still facing. We have a tremendous amount of debt on the same number of acres that farm families did not have 25 to 40 years ago.

STRESS

I am the first generation of my family to have high blood pressure before I was 40. And I think maybe that says something. But it is the life and the stress that we live under that we did not have. Even my kids talk about the good ole days. I think it is sort of a myth that the quality of life is better today.

I do not want to go back to not having a bathroom, and that kind of thing, and I am not even one to plow with a mule, but I think we get a little bit carried away with high tech. As I said, my kids go to the same school that I did in the same community so we did not have a problem with drugs in our school then. We do have a terrific problem now. Drugs and alcohol, kids coming to school drunk. That did not happen back when I was in school. So I think those kinds of things we have to look at and say, I do not think life is really better today.

CHANGE IN BEEF

The other thing I wanted to comment on or another thing was the person—I did not catch his name—the person before me talked about the change in beef and how all of a sudden they are making this change and they are going to pay people on the net carcass weight, strip all the fat off. Well, my problem with it—I do not think that is all bad getting rid of the fat—but my problem with it is us as the producer cannot adjust to that fast enough to stay in business. You know it takes my cow 9 months to have calf and 18 months to get that calf to market. So we should look at how far back you are going to have to go to start genetically changing those cattle to produce beef, just beef, for example, to that kind of thing.

WE ARE NOT ABLE TO ADJUST AS PRODUCERS AS RAPIDLY AS PEOPLE MAKE THE TECHNOLOGY CHANGES

And this has sort of been a complaint that I have had in the whole credit thing is that we are not able to adjust as producers as rapidly as people make the technology changes. And I think that has to be taken into consideration. We need a transition time, and I think that follows along with the chemical, the whole low-input chemical thing. It is a very good move, but we do not have—I do not see any provisions in this for transition.

WE HAVE HAD AN EMPHASIS ON QUANTITY INSTEAD OF QUALITY

And the other thing I wanted to say was that it is sometimes what we use as a measure that, you know, we have had an emphasis on quantity instead of quality. And hopefully we are going to move back to that.

TERMINOLOGY IS A PROBLEM

And I remember that we live near a rest park on Interstate 70. And there was a load of petroleum products of some kind that was dumped there. And it went down the stream. In the newspaper it was OK. Everybody was safe. It was acceptable levels, but let one farmer spray too close to the stream, and all of a sudden we have a terrific problem. So I think our terminology sometimes is a real problem in what it is that we are trying to do.

So those are the things I kind of wanted to comment on from the previous statements.

RESEARCH IS DONE IN THE NAME OF AGRICULTURE, BUT THE BENEFITS NEVER GET DOWN TO THE FARMER

The thing that I think farmers see with ag research, and I know this as a farmer specifically, is that I think farmers object to the fact that so much research is done in the name of agriculture, but the benefits never get down to the farmer.

Senator **DASCHLE**. Like what?

Ms. **BRIGHT**. Well, I know in Indiana once we had this big thing where they were going to have a factory or a processing plant come in. They were going to make a new kind of corn chip, and this was going to use more bushels of corn, and it was going to provide jobs and all this and that is fine. There is nothing wrong with that. But the farmer did not benefit, not that first iota, because he did not see his price go up.

And that is the bottom line. That is what we need. We need something to increase our net farm income.

Senator **DASCHLE**. You cannot really blame that on the corn chip?

Ms. **BRIGHT**. No. And I do not have a problem with the whole thing. I was all in favor of it. What I objected to was them calling it agricultural research that was going to benefit farmers—it was sort of a trickle down thing that never got clear down to the farm.

There was nothing wrong with the factory. There was nothing wrong with the whole concept, nothing wrong with increased jobs. That was great. It just did not trickle down to the farmer, and I think again that is something that I would like to see a little more attention paid to. And I think this tail wagging thing that you were talking about earlier is so true that we as the taxpayers provide Purdue University and there is the facility there.

And somebody comes along, a private company comes along with a big grant, and it may not necessarily benefit the public. You know I am not sure all these chemicals are good. I do not like all these chemicals that we spray on our farms and yet it sure does benefit the chemical companies, but does it actually benefit the farmer? My husband was burned severely by anhydrous ammonia several years ago so we quit using it.

And yet they said this is the way you have to use this stuff to get increased corn yields and so I think that is what we have to look at, does it really benefit just because it is better and makes more bushels. I think that is all I was going to add.

Senator DASCHLE. Thank you, Susan. Mike.

[The prepared statement of Ms. Bright and the prepared statement of the Dakota Rural Action follow:]

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TESTIMONY OF NATIONAL FAMILY FARM COALITION
PRESENTED BY SUSAN BRIGHT, INDIANA FARMER
SENATE AGRICULTURE SUBCOMMITTEE ON
RESEARCH AND GENERAL LEGISLATION
JUNE 9, 1989
WASHINGTON, D.C.

I am pleased to be here today on behalf of the member organizations of the National Family Farm Coalition (NFFC). The NFFC is a coalition comprised of over 40 organizations in 32 states working for policies to strengthen the family farm structure and revitalize rural communities. We have fought for changes in agricultural credit policies during the past two years and are now developing a proposal for the 1990 Farm Bill that will deliver fair prices from the market and establish an effective program of supply management.

We appreciate your leadership in addressing the research needs that must be a part of the 1990 Farm legislation. It is the research priorities that are embraced by our educational research institutions funded by both federal, state, and private funds that dictates for the most part, the types of options available for family farmers. It is not only the research conducted at the institutions, but the dissemination of research results through extension and experiment stations that could be the best way of assisting all types of farmers and strengthening the family farm system.

Unfortunately the past twenty years of agriculture research has benefitted the largest farming units. Corporate agribusiness has in fact largely dictated the research agenda. No example of this trend is clearer than in the area of biotechnology research. Animal cloning, bovine growth hormone, herbicide resistant plants are soon to become a reality. These "advances" have questionable if not negative benefits for the family farmer. There is no doubt however, that the chemical and pharmaceutical companies who will own and control these products will profit.

As a farmer in Indiana for over 15 years and previously a student at Purdue University, I feel I can talk personally about the impact of the priorities in place at that one institution which I know is indicative of other research institutions.

Because agricultural research and the land grant system has such an impact on our food production system, we urge Congress to reevaluate and redirect the research agenda so that family farmers, rural communities, and the larger population will benefit most from the research. Both our rural farms and rural communities must be sustained.

Scarce public research funds has too often placed research institutions in the position of receiving private funding which removes the research priorities from public scrutiny. Taxpayer supported research institutions must be held accountable to their constituency, the taxpayers; research projects funded by private industry ought to benefit the public good.

It is easy to recognize the growing concern over the dangers of high-chemical farming and its impact on the environment, farm families' health, and food safety. However, little research funds have been appropriated to assist farmers in making the transition away from chemically dependent farming. In each of the past two years only 5 million dollars, less than 1% of the federal investment in agricultural research has been appropriated the low-input/sustainable agriculture programs. The failure of these types of programs to receive USDA research funding in the early 1980's necessitated Congress to legislate a separate program through the Agriculture Productivity Act to ensure that these types of programs received research funds and priority.

Given the growing concern over high-chemical farming, and the economic risk that farmers must take in making the transition, low-chemical input sustainable farming research should be a central component of the ag research program. Without this shift, farmers will be locked into more conventional farming methods due to the lack of demonstrated research results on alternative farming practices.

The National Family Farm Coalition would like to see agricultural research priorities restated clearly in the next Farm bill. Furthermore, Congress should mandate a social, environmental, and economic evaluation on the potential impact of research projects.

One area of major concern to family farmers is the impending approval by the Food and Drug Administration of Bovine Growth Hormone. The result of daily injections of this hormone into each cow is to increase the dairy production per cow while reducing the lactation life by one-third. Its promoters include the chemical companies and manufacturers and high tech promotion organizations. The Coalition is strongly opposed to its approval.

The use of BGH is a precedent-setting issue. The adoption of this biotechnology could destroy the fabric of family dairy operations. Major chemical companies have spent millions in research on BGH and now are spending equal amounts in advertising campaigns to protect their investment. This shift towards biotechnology research must be debated and closely monitored to ensure that its whole impact - on human health, animal health, on family farmers and rural communities - is considered.

We appreciate the opportunity to present our concerns to you today. This is an issue of great importance to NFFC organizations as we develop agricultural policies that ensure farmers a decent income, protect the environment, and sustain our rural communities. It is the research priorities being established this year on Capitol Hill that will hopefully redirect the research scope at our nation's research universities. Without this shift, there will continue to be research priorities that are directed by agri-business without regard for changes and improvements in farm practices. This need to shift is not just on the research level, but there must be increased awareness of the impact that agribusiness is having on curriculum development - both at the High School and College level.

We look forward to working with you as the 1990 Farm Bill is written with cooperation and input from family farmers around the country. Thank you.

TESTIMONY OF DAKOTA RURAL ACTION
SENATE AGRICULTURE SUBCOMMITTEE ON RESEARCH AND GENERAL LEGISLATION JUNE 9, 1989

Dakota Rural Action (DRA) is a grassroots, membership-based organization of rural people who work for the protection of family farm agriculture and rural communities. Since it began in 1987, Dakota Rural Action members have sought to make public institutions accountable to the constituencies that they serve. These institutions include the Farmers Home Administration, the Farm Credit System, state and federal farm and economic development programs, and most recently, our state land grant university.

The Dakota Rural Action Board of Directors and Dairy Committee appreciate the opportunity to present our views on the issue of research as it relates to agriculture.

DRA members have worked for the last year on a dairy campaign, the main goal of which is a fair price for dairy products with a responsible supply management system, targeted to family farms. The DRA Dairy Committee also has addressed BGH bovine growth hormone, which is a questionable technology that is supposed to enhance their operations but which may very well destroy their way of life. BGH is a naturally-occurring hormone that is now being tested for use in dairy cows to increase the production per cow. Its promoters include the chemical companies and manufacturers and high tech promotion organizations. Its opponents include several national farm and citizens groups, including the National Family Farm Coalition, AAM, National Farmers Union, the Foundation on Economic Trends and the Coalition for Responsible Technology.

South Dakota State University has recently studied BGH, paid for in part by American Cyanamid, one of the companies which make this product available. DRA members have reviewed dozens of articles on BGH, including the SDSU study, and they have also met with two members of the Dairy Science Department at SDSU in Brookings to gain additional information on which to judge the merits of this product. Two main questions have been raised by DRA members in regards to BGH:

1. Will BGH promote family farm dairy production - will it help or hurt the small producers
2. Is BGH safe - will it help increase consumption because of improved quality of milk and cheese

The SDSU study sought to address #2, but did not begin to address question #1.

The controversy surrounding BGH often centers on whether it is safe, not only for the cows but also for humans. A good deal of research to date indicates that it is.

BGH has been proven to increase milk production, and was in the SDSU study. Normally, one might think that if a farmer produces and sells more milk, he will make more money. That is true up to a point. If enough farmers increased their production, the point will be reached where the government declares that there is a surplus of milk and, therefore, must cut the farmers' price to discourage production.

Also, the SDSU study states that since the cheese yield for BST-produced milk is lower, "Cheese manufacturers may want to evaluate milk pricing structures for purchasing milk, since casein content is lowered slightly." These factors will certainly put many farmers out of business. The universities should, then, consider factors such as this when doing research. Not only should the researchers find ways of improving products and processes, but they should also find ways of dealing with the consequences of introducing that improved product or process.

The following information is taken from a report prepared for the Wisconsin State Legislature entitled, "The Social and Economic Impact of Biotechnology on Wisconsin Agriculture:"

> The commercial release of BST to the Wisconsin dairy industry will probably maintain if not accelerate the ongoing trend toward fewer but larger farms. As BST is adopted and diffused through the Wisconsin countryside, we will see certain dairy farms going out of business. . . [M]arket and political forces, in response to increased milk supplies, are likely to decrease support prices. Since moderate and large sized operations appear likely to be among the first to adopt BST, they will gain profits prior to the market response. This will put them in a better position to survive the decreased support prices. Some marginal operations will be unable to survive with lower milk prices.

There are trade-offs with advanced technology--some people "win" and some people "lose." It should be the responsibility of the institutions that give positive reports on the safety and efficiency of a product such as BST to provide the negative reports on the effects it will have on other aspects of the farming operation.

Another concern that should also be addressed is the reaction of consumers to milk that has been produced by artificial means. The SDSU indicated that there is no difference in quality and states between milk from cows treated with BGH, and from cows not treated. While consumers might be assured by this study, it doesn't follow that they will continue to buy the milk with BGH.

For example, a survey, "Consumer Responses to the Introduction of BST Technology: Devising a Communications Strategy," was prepared for the National Dairy Board. Six groups of people were questioned about BST. These people had a number of concerns. One said that the use of BST was "tampering with nature." Another was bothered by the long term effects. She said, "Today it's safe, tomorrow it's dangerous." Still another was skeptical of a product's approval by the Food and Drug Administration. She said, "'The FDA says it's safe! Don't be alarmed.' Which makes you alarmed right there."

Consumers are more health-conscious than they used to be. Television is filled with commercials for all kinds of foods that allow people to remain healthy. Milk and other dairy products are also advertised in this way. Milk is presented as a "pure, natural" product. Since the public is concerned about additives and preservatives and "hormones" in their food, the use of BGH to produce their milk could have a harmful effect on the dairy industry. The universities should conduct the research necessary to determine consumer reaction to the use of BGH.

The universities receive funding from the government and, therefore, should be responsive to the needs and the best interests of people who are supposed to benefit from the research. The universities also receive funds from the companies that manufacture BGH to determine its safety before it is marketed. Receipt of funds from these companies should be prominently mentioned. If a report is issued from a university, the public might infer that the university took on this research on its own, the findings of which might seem totally unbiased. If funds were provided by the company that manufactured the product being tested, perceptions might change.

In studies such as this, efficiency of a product should be measured for a wide range of possible users. For example, study of the ease and profitability of use should be examined for small-, medium- and large-sized farms. It may be that on a small farm, where there is less labor available, this product would not work as well as on a large farm where there would probably be enough personnel to give the injections and do the milking and the feeding without adding a significant amount to the labor expenses. This should be determined..

When a movie is about to be released, the studio holds preview screenings to determine the public's reaction. When a company introduces a new food product, it conducts taste tests. These test marketings are conducted with the people who are likely to use the product. Likewise, the universities, in testing a product that will affect the entire farm population, should consult with these people who will use their product.

We believe that SDSU needs to go further in its BGH studies if it is to live up to its mission to serve family farm agriculture. Until the other dimensions of this product's use are studied - most importantly, the economics of BGH - the producers of BGH are better served by SDSU than the family farm dairy operator in

South Dakota. Here are some recommendations for improving research procedures overall:

1. SDSU should annually hold public hearings to solicit the views of farmers, farm organizations, organic producers, commodity groups and those working in farm-related businesses, to find out what research these people believe would be most helpful. Possibly a research advisory committee could help screen and direct research that is appropriate to family farm agriculture.
2. Prior to the start of a research project, SDSU should assess how this research is relative and beneficial to South Dakota farmers (to the extent possible).
3. Solicit farmers' input on new products and procedures that are supposed to benefit them.
4. Conduct public meetings when a study has been done to allow for additional input.

Thank you.

STATEMENT OF MICHAEL V. DUNN, LEGISLATIVE DIRECTOR, NATIONAL FARMERS UNION, WASHINGTON, DC

Mr. Dunn. Thank you, Mr. Chairman. My name is Michael Dunn. I am the Director of Legislation for National Farmers Union which represents about 300,000 family size farmers.

1990 FARM BILL AND WORKING ON THE COMMODITY PROGRAM ASPECTS OF THAT

Mr. Chairman, I would like to thank you for having this hearing today because it gives us an opportunity to stop and look at what we are going to be doing in the next 12 months or so. We are all going to be posturing ourselves and working very hard on the 1990 farm bill and working on the commodity program aspects of that.

IMPACT OF THE 1990 FARM BILL

And that is a bill that is probably going to have a real impact on farmers and ranchers for the next 4, maybe 5 or longer years, depending how long the life of the bill is. The research title of that bill has the potential to have an impact on agriculture for decades to come. And it imperative that that research title has some direction from Congress and is structured so that we have an agriculture in the 21st century that is beneficial to the Nation as a whole and to the producers of those commodities that we depend upon. So I commend you for having this hearing now and beginning to structure that title of that bill because it is going to be extremely important.

FARMERS UNION OVER THE YEARS HAS ALWAYS SUPPORTED RESEARCH IN AGRICULTURE

Farmers Union over the years has always supported research in agriculture. We have always come out in support of it. We think it is the thing that we need to do. We have seen cutbacks in this research. Since 1962 we have seen continuous cutbacks.

When President Lincoln signed the legislation that established the Department of Agriculture, the "people's department," as he called it, he said, "There is hereby established at the seat of Government of the United States, a Department of Agriculture, the general designs and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word."

ARE WE FOLLOWING THE STATUTE ESTABLISHING THE DEPARTMENT OF AGRICULTURE?

Well, are we doing that today? Mr. Chairman, I think that is an important question. We are seeing research take place, and as the Center for Rural Affairs has indicated, what is the skew of that research? Is it simply to promote bigger agriculture production, greater farms, the factory, the farm factory, or is it to enhance and promote the family sized farm operation?

WE HAVE SEEN USDA RESEARCH AND EXTENSION SERVICES GET AWAY FROM THAT

I think in the past few years, Mr. Chairman, we have seen USDA research and extension services get away from that. About 10 years ago, I was the Director of Farmers Home Midwest operations. In 1979 we were trying, got a group of the State directors together, and we were trying to come to grips with how could we implement the limited resource provisions of the Farmers Home Administration.

And Mr. Chairman, it was Jack Wyland, the Chairman/Director of Farmers Home in your State who responded when I asked, well, cannot we get Extension Service to help these limited resource farmers in putting together a management plan to make their operations viable. Jack said, ha, the only thing they are interested in are the blue silo boys.

Now, Mr. Chairman, that is a reference to the big farms, the high technology. It is a two-fold indictment of that system. Number one, they were not willing to work with the small, family size operator, the struggling individual, but also they were unwilling to work with sister agencies. In this case, Farmers Home Administration, to make their programs work.

We have limited resources. We have heard this going in to research and development areas. I am sure the Senators that were formerly governors can attest to the real gut wrenching problems that they have had in trying to balance their State budgets at a time when we were into an agricultural crisis and real hard decisions had to be made about education and how much money can we go into research and development in the agricultural area and cooperative research and Extension Services.

And at that time, we were seeing the Federal Government abdicate its responsibilities and cut down on the dollar amount that went into it. You ask about how can we keep the tail from wagging the dog? It is simply take care of the dog, give it enough money to do independent types of researches. And while I am on that subject, I have been listening to Senator Conrad of the Senate Ag Committee allude to the fact that research has been done at ERS that might establish what the outcome of doing provisions of the United States GATT proposal.

And his allegations were that those research papers never were published, never were disseminated to the population as a whole, never got to Congress to take a look at. Mr. Chairman, if there is that type of censorship, if there is that type of stifling of information at the Economic Research Service, perhaps the committee ought to take a long, hard look at what goes on down there to ensure that those researchers have academic freedom and can pursue and publish the research that they worked so hard on no matter whether it reinforces the administration's or even the congressional proposals.

We talked a bit about has research really benefited the agricultural sector and the farmers. A couple of years ago, I was at Columbus Junction, Iowa at the local grain elevator, and it was harvest time and the grain trucks were lined up for miles on end and the grain wagons were lined up, and we were all sitting on the bench swapping tales and lying to each other. And old crusty farmer was there, and they were talking about all this grain—it happened to have been a bumper crop-year—all the grain that we had.

And this old fellow turned to the other fellow and said, you know, I kind of liked it back in 1950. I lived just as well, and I did not have all this damn grain to haul. It would appear, Mr. Chairman, that past research has promoted bigness, how to get the last bushel out of the acre, but it has not really done research on the quality of life or to increase the profit to the producer of those bushels and bushels and bushels of grain.

WE NEED TO BE ABLE TO GO BACK AND SET RESEARCH GOALS THAT LOOK AT HELPING FAMILY SIZE OPERATIONS

We need to be able to go back and set research goals that look at helping family size operations. We need to set goals and we need to evaluate and reevaluate what is happening in the research area. In the 1990 farm bill, Farmers Union is going to advocate in the research title that we do some things, and let me go through those quickly with you.

In the past it seems that the vast efforts of agricultural research efforts have been geared toward how American farmers might increase production. National Farmers Union believes that farmers have shown a substantial ability to overproduce. Research to increase supply must yield a greater share of precious budget authority with research in several other areas. This includes research to increase demand.

We need to encourage research into new use for agricultural products such as ethanol, other alternative energy sources, polymers made from cornstarch, economic, domestic produced casein and glues and paints, et cetera. There is an enormous potential for rural economic revitalization in producing value added products. This technology is definitely worth the research investment.

Number two, research on environmental impacts on chemical intense agriculture. Most rural residents rely on ground water as their sole source of drinking water. Ground water which too often shows traces of agricultural chemicals used for years in the ordinary course of farming. Researchers have begun the process of identifying which chemicals are present in different aquifers. But more resources must be directed to these efforts. Research is also needed to find cost effective method of reducing topsoil loss.

Number three, research on nonchemical alternatives such as integrated pest management, closely related to the need to identify the impact of what current practices is the need for research into nonchemical alternatives for pests management that can reduce the amount of poisons introduced into our environment.

Unfortunately, as Federal research dollars have been drying up, land-grant universities have relied more heavily on grants from chemical manufacturers, again to the question of the tail wagging the dog. Perhaps one area, Mr. Chairman, that we can get more independent type of research is by looking at the use of the checkoff dollars. There seems to be a fast track for soybean checkoff bill coming up.

Let us ensure that the money that comes from that is used for research purposes and not lobbying efforts. Let us ensure that the money goes back out to the land-grant universities in the 1990 colleges to develop that type of empirical data that we need to do independent research.

Research to update past work on economies of scale. The Food and Agricultural Policy Research Institute, FAPRI, did an analysis several years ago, which indicated that a farm with a gross annual income of about $150,000 had reached the maximum economy of scale. With biotechnology on the horizon, new management techniques and the advent of stricter payment limitations this research should be updated.

National Farmers Union believes that the family farm structure will be proven to the most efficient agricultural production unit. In that same vein, Mr. Chairman, as we go about looking at alternative farm programs, one of the most difficult items that we as a farm group, that you as a Member of the Congress have, is establishing what the impact of the various proposals are going to have on the budget of the United States and on the structure of agriculture.

Right now there appears to be only two places in the world that we can get that information, from the Department and from FAPRI. Why are we not doing research to provide other type of resources to have that type of analysis available so that decisionmakers can make decisions based upon the knowledge of what the impact is going to be of that decision?

Certainly, we hear from the congressional Budget Office as to what the financial impact is going to be. But the congressional Research Service does not have the capability to do the type of research to give you the information you need to make those decisions. Research on the economies of new technology, closely related to the research on economic efficiencies of size is research to assure that new technologies and the products of new research are directed to those end users who will derive the greatest benefit.

NEW TECHNOLOGIES WILL HAVE LITTLE VALUE UNTIL THEY ARE AVAILABLE FOR USE BY THE CONSUMING PUBLIC

New technologies will have little value until they are available for use by the consuming public. Again, we seem to have a real dichotomy going on at our universities that are doing the research. People are doing research without a real input from the end users. Certainly, the Joint Committee and the User Advisory Board is a step in the right direction. The User Advisory Board makes a recommendation that impact statements be made or be done on any types of research that is going to be done.

I think that is a good idea. But it also makes a request that multidisciplinary approach be developed to establish what type of research is done. And I think this is very, very important. We see research being done at land-grant colleges and then stuck on the shelf. We do not see that research being the type of research that is needed for family size farmers. We do not see the research for new technologies being integrated into the mainstreams of the economies of the State.

NEEDS

There seems to be that entrepreneurial spark missing, as our land-grant colleges come up with new products, new technologies that may enhance rural communities, that may do rural development, and they sit on the shelf.

There needs to be a greater utilization, a greater melting of the various groups within the States, the public and private sector to get those technologies and get into the States and expand the economies of the rural communities. Research on global warming trends and impacts on traditional farming practices. Largely, due to last year's drought, this issue has received considerable public attention.

Yet clearly we do not know enough to plan for the future. Some have suggested that the wearing away of the ozone layer and the resulting increase in the Earth's temperature will gradually shift the Grain Belt northward into Canada. While this sounds remote, it cannot be ignored. The eventual loss of our grain production capacity could unquestionably threaten our national security.

Research on animal husbandry practices. Technology is already changing livestock production as we know it to the point that patenting of animal life has become a major issue for farmers faced with the prospect of paying royalties. Additional research is needed to ascertain the long-term cost and benefits of these changes from both the consumer and the farmer perspective.

In addition, we must acknowledge legitimate concerns over the welfare of animals raised for food and scientific advance and provide research and assure that animals are used in a responsible fashion. Mr. Chairman, the animal patenting bill will be a hot item this year. We need to have empirical data that is not being established by the industries involved, but by independent researchers that can come to you and say here is what the real problem is. Here are recommendations on this biotechnology, which is going to be such a big issue in the coming years.

The need is crying for research out there that is unbiased and infallible. Research to improve crop quality is needed along two related lines. First we must break the cycle of plants that become resistant to pesticides and require greater applications to accomplish the same result. Second, we must continue efforts to improve the pest resistance of crops so that quality can be maintained with lesser dependence on chemicals.

Developing technology beneficial to family sized farmers is needed. Research must be aimed at designing technology useful to family farms which will maximize profit. Research that aims to increase consolidation of food production into the hands of fewer people is not in the public interest.

Farmers Union agrees that the 1989 report of the National Agricultural Research and Extension Users Advisory Board which stressed that the health and profitability of our agriculture is essential to the economy and health of the United States.

Mr. Chairman, we believe that it is imperative that in developing a 1990 farm bill reaffirms the commitment to the family size farm, and that you require that reports be made by researchers as to the impact of what that 1990 farm bill will have on family farm structure. Is the goals of Congress being met by the Department of Agriculture? I think it is incumbent upon you to have reports periodically during the periods of that 1990 farm bill that reports to you what the impact of what that bill was.

Are we going to have a bill that will continue to deplete the number of family sized farms. We have lost almost 300,000 in this decade? Or are we going to have a farm bill that is going to try to slow down, stop, or even reverse that demise of family farms? It is within your power to say that is what the intent of that legislation is, but you are going to need the research services to report back to you whether that goal is being met.

Senator, I thank you for the opportunity to address the committee. National Farmers Union thinks this is a most important item, and we commend you again for your time and efforts.

Senator DASCHLE. Thank you, Mike.

[The prepared statement of Mr. Dunn follows:]

NATIONAL
FARMERS
UNION

STATEMENT OF THE NATIONAL FARMERS UNION

Submitted by Michael V. Dunn
Legislative Director

Presented to the

Agricultural Research and
General Legislation Subcommittee

of the
Senate Agricultural Committee

Hearing on Research and Extension

June 9, 1989

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STATEMENT OF NATIONAL FARMERS UNION

presented on June 9, 1989, to the
Agriculture Research and General Legislation Subcommittee
of the Senate Agriculture Committee

Relative to
RESEARCH AND EXTENSION

Good morning. I am Michael V. Dunn, Legislative Director for the National Farmers Union. Historically, the United States has had the best food production system in the world. The topics of your hearing, Research and the Cooperative Extension Service, provide two of the key ingredients in promoting efficiency and technology to the 300,000 farm families I represent.

Over a period of history, the record will show that the National Farmers Union has opposed budget proposals to reduce research allocations and has consistently advocated larger funding for these purposes than have been proposed by the Executive Branch.

We are concerned, for example, that the provision in the Fiscal 1990 Budget, for subfunction 352, agricultural research and services, at $2.10 billion, is projected to decline by $120 million to $1.98 billion in Fiscal 1994. This is shown in "Historical Tables, Budget of the U.S. Government, Fiscal 1990".

We note with concern as well that while the Fiscal 1990 Budget proposal advocates a $20 million increase for ARS, it recommends $53 million less for the Cooperative State Research Service and $36 million less for the Extension Service, than in the current year. This is shown in "U.S. Department of Agriculture, 1990 Summary".

Although substantial sums are being allocated for research, USDA has since 1962 been systematically cutting back on its mandated duty to collect and disseminate agricultural information.

In the statute establishing the Department of Agriculture, signed by the President on May 15, 1862, it was clearly stated that "There is hereby established at the seat of Government of the United States, a Department of Agriculture, the general designs and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word."

Numerous reports have now been eliminated, while others are issued with less frequency. Many which were once issued free are now available only on a subscription basis. This is contrary to the intent of the Congress in authorizing these research and educational services.

At times, Farmers Union has found it necessary to react to the nature of the agricultural research as well as to the sheer dollar numbers.

We have objected, for example, to the tendency to promote bigness of agriculture--even though USDA's own specialists on agricultural structure acknowledge that efficiency declines on farms larger than those of a scale which a family could operate.

At other times, federal research dollars were spent in experimental work and technology useful only to larger-than-family corporate farming operations. If the so-called "factories in the field" need research done for their own special benefit, they should stand ready to finance it themselves. As a matter of fact, agribusiness currently is investing about $2 billion a year in agricultural research, about the same amount as does the federal government.

In the Farmers Union, we do not consider it either necessary or proper for federal resources to be spent in promoting an agricultural structure or technology which is destructive to the family farm system. We do think it is appropriate to conduct research of a type consistent with a family-scale structure of agriculture. However, agricultural research policy needs to be determined in the context of overall and balanced agricultural policy.

The implementation of new technology has the same effect as putting more acres into use. If surpluses are already burdensome, the application of new technology has the same price-depressing force as the planting of additional acres.

Application of research to an extent that will demoralize farm prices and markets does not make sense. The point is that both research and price support measures belong in an overall food and agricultural policy.

It is obvious that the billions spent by the federal taxpayers on agricultural research have been beneficial--to consumers, to agribusiness, to society generally, but not always to the advantage of farmers.

True, research has reduced farm drudgery and it has increased the amount of agricultural resources a farmer and his family can operate, but when the new technology aggravates already destructive surpluses, the producer is injured rather than helped.

The above is not being stressed as an argument against basic research. Farmers Union recognizes that we cannot be chained to the past. Agriculture needs the flexibility to change as products and markets change. The point is that price supports at a fair and remunerative level are vital if the farmer is to benefit from his own gains in productivity.

In order to be sure that our research dollars are spent in the most effective way, one must keep re-evaluating the goals of the research. In the past, much attention was focused on maximizing our agricultural production capacity. This goal has been successfully developed, sometimes even to the exclusion or detriment of other important goals, such as improved net farm income, environmental quality, new products, new processing methods, new marketing techniques, and balance between supply and demand. We believe the time has come to re-evaluate our priorities to ensure that publicly-funded research is meeting public needs.

The National Farmers Union articulated six goals for research in our policy statement, adopted at our 1989 convention. Research should be aimed at:

1) Improving product quality. Improving product quality is becoming increasingly important as the market becomes more and more competitive. Providing a clean, safe food supply is necessary if the United States is to maintain our global leadership in agriculture.

2) Improving marketing systems. In addition to constantly striving to produce a better product, attention must be focused on developing an expanded market and on improving the way products reach consumers. Research has had great success in increasing the supply. Without similar success in increasing the demand, we jeopardize our agricultural economic infrastructure.

3) Identifying new uses for agricultural products. Despite last year's drought, American agriculture has not lost its ability to overproduce. For example, corn is still in surplus, resulting in lower prices to farmers and increased costs to the taxpayers who must pay for the storage. Now, while stocks of most commodities are lower than they have been in recent years, is the time to develop new uses for agricultural commodities to provide a long-term increase in demand. Again using corn as an example, we are very supportive of continued research into alcohol fuels and biodegradable containers. Bills such as S.244, Senator John Glenn's Agricultural Commodity-Based Plastics Development Act of 1989, are a step in the right direction.

4) Improving international trade. We need to be sure that the technology we are developing is consistent with the demands of the global market. For example, growth stimulants may appear to enhance the level of beef production, but if beef produced with a growth stimulantant banned by foreign markets, the producer loses out.

5) Developing low-input agriculture. Everyone loses when high-tech production results in over-use of pesticides and fertilizers that wind up in our groundwater. Today's researchers must consider the environmental and economic impacts when designing new production methods. Only then can we be sure that technology is improving our system, and not just clogging it with surpluses that will cause irreparable harm.

6) Developing technology beneficial to family-size farms. Research must be aimed at designing technology useful to family farms which will maximize profit. Research that aims to increase consolidation of food production into the hands of fewer people is not in the public interest. Farmers Union agrees with the 1989 report of the National Agricultural Research and Extension Users

Advisory Board (UAB) which stressed that "the health and profitability of our agriculture is essential to the economic health of our nation".

To meet these goals, the National Farmers Union urges the USDA to allocate increased research support to land grant colleges, enabling them to fund and carry out research into alternative agricultural technologies. The National Farmers Union believes that the same land-grant colleges and universities that helped create the technological revolution in agriculture should now focus on solving the surplus situation and helping farmers to produce the highest quality product in a manner which maximizes profit and promotes a clean environment.

Farmers Union also agrees with the UAB recommendations of requiring an economic impact statement for all major research programs and using more interdisciplinary research teams. These steps would help ensure that the researcher's scientific bias is not blinding him or her to the effects of the research. For example, it may be natural for a dairy scientist to think that the purpose of a dairy cow is to produce the highest possible volume of milk. Ideally, the team approach would consider the taste, the quality, the consumer demands, the cost of production, the health of the cow, the impact on producers and the dairy industry, and the environmental impact.

In order to accomplish these goals, it is crucial to provide money for special projects. It is also crucial to ensure that the Cooperative Extension Service is adequately supported by federal, as well as state and local dollars.

The Cooperative Extension Service (CES) was established with the mandate to help the public learn about and apply to everyday activities the latest technology and management knowledge. The National Farmers Union believes that this valuable rural information delivery system's role must be reassessed and strengthened to meet the demands of a rapidly changing, highly sophisticated technology delivery.

The top priority for Extension should be working with family size farm operations. Extension should give priority to developing techniques and teaching methods which enhance and perpetuate the family size farm. Further, Extension should be the strong advocate of Low-Input/Sustainable Agriculture (LISA). It is disappointing to see that the Administration has failed to recommend funding for LISA in the proposed budget for FY1990. National Farmers Union strongly urges members of Congress to correct this omission and fund LISA at the $15 million level authorized by law.

A 1988 study conducted by the University of Minnesota Agricultural Law and Policy Institute revealed both opportunities and deficiencies for Extension. Farmers in five counties in five different states were surveyed regarding groundwater quality. The study showed that: 1) Farmers were receptive to suggested federal research and technical assistance programs to help reduce their use of agricultural chemicals, 2) Farmers generally trusted the information provided by Extension, and 3) Farmers found a shortage of available information from Extension regarding groundwater.

Those working in Extension will point to the general funding cut as their biggest problem. This problem is further complicated by the fact that although Extension was formed based on a partnership of the county, state, and federal branches, the federal government is not keeping pace with state and local increases. The shortage results in the Extension System cannibalizing itself, as staff positions are cut to make up the difference. The resulting loss in terms of research and extension work are much greater than the savings in dollars.

At a time when we should be promoting an interdisciplinary approach to agricultural technology, we cannot afford to chop out our team members. There are too many educational challenges facing American agriculture, and studies have shown that farmers trust the Extension Service as a valuable source of information. We need Extension involvement in teaching farmers how to farm with less chemically intensive methods that maintain profitability. We need Extension Service involvement in helping farmers to make the best use of seemingly limitless advances in technology.

Thank you for the opportunity to present our views. I would be happy to answer any questions you might have.

Senator DASCHLE. Senator Kerrey, do you have any questions?

Senator KERREY. Yes. Mr. Dunn, you do not actually want us to have a report sent over to USDA for every piece of research that is being done?

Mr. DUNN. Senator, what we would like to see reports on are impacts of what is happening with the program. What is the impact on family size farm operations as a result of the bill? Now that is not going to be on every piece. That can be periodically done. Are we accomplishing the goals that Congress has established in that bill?

There is no use to wait till the end of that farm bill period before we find out we have made an error. Certainly, research should be structured to find out where are we going. Where are the policies taking us?

Senator KERREY. Well, I do not disagree with that. My concern is that the recommendation may not assist in accomplishing that. I can just tell you that I have not even read your testimony yet, and it is not like I have a shortage of things to read. I do not know who is going to read these reports that are going to be sent in.

I do not necessarily mean that I think this is a bad recommendation. I simply do not see how it is going to enable us to determine what the research is going to do to agriculture.

I want to get very specifically to the bovine growth hormone issue. I see in your testimony [Ms. Bright] that you have objected to the bovine growth hormone.

Tell me if this is right or not. You appear to object because the technology will increase productivity. It will increase production from the dairy cow. Is that correct? Actually I was directing my question to Ms. Bright and her testimony.

Ms. BRIGHT. Well, that, and then it is the cost of that product is increased because of using that drug, and then there is this whole idea of chemicals. I have had several people say to me lately, "how do I get my own cow?" They do not want to drink that milk that has the chemically induced milk production.

Senator KERREY. But there you are getting to a health issue. What if FDA concludes that bovine growth hormone is safe from a health standpoint, and you and I look at the data, and we agree it is.

Ms. BRIGHT. Thalidomide was safe at one time, thought to be safe at one time.

Senator KERREY. Thalidomide was, by the way, a drug that arrived at the marketplace as a result of mistakes that have since been corrected. Let us assume that the review process is open, and we evaluate it from the standpoint of health. What I hear in your testimony is your concern about bovine growth hormone from the standpoint of have we got plenty of milk? We have plenty of milk and cheese now. And this technology will potentially increase our productivity and decrease the number of people required to produce the product for the marketplace. Is that what your testimony is saying?

Ms. BRIGHT. Well, I think that, right. That has the potential there, but I think it is the safety factor probably even more than that because you have to feed that cow more. You can just inject her with something. It is almost like they are thinking, oh, good, we can go out here and inject our cows and they will produce more. It is not that simple. I mean for a cow to produce a third more milk, she has to eat more feed.

Mr. DUNN. Senator Kerrey, that is where we agree with one of the provisions of the User Advisory Board that there should be some type of economic impact and environmental impact on the research. If we go to BGH and we produce more milk, what is going to be the economic impact on agriculture sector as a whole to the family farmer that is in there? Who is going to be producing the milk? Is there going to be a major structural change as a result of this?

What is going to be the impact on the cattle industry if we have a substantial reduction of the dairy herd as a result of BGH?

Senator KERREY. I understand. I understand. But I could have similarly reached the conclusion 40 years ago that we should not permit television to be introduced in the United States of America because of the likely negative impact upon rural America.

But the fact of the matter is I think it would have been a mistake for us not to permit that technology or for that matter hybrid corn to be introduced 50 years ago, based upon a concern that, gee, it is going to require fewer people. I think there must be some concern. We ought to screen out those things that we think are going to make the world unhealthier.

But if the technology is simply going to make us more efficient, then it seems to me that we as policymakers have to be concerned that we do not put a policy in place that accelerates that trend. That is all. I think this gets back to Chuck's concern about whether the farm program itself reinforces the use of the technology that we have introduced without any concern for what the outcome is going to be. But we should not keep the technology out of the hands of individuals in the first place, if you follow what I am saying. If you can demonstrate to me that the bovine growth hormone is going to be bad for the health of my children and myself, then we ought to keep it off the marketplace.

But if the only concern is increased productivity, I think that it would be a mistake for us to say that we are going to ban a technology, that we are going to make it unavailable to the people because it is going to lower their cost and make them more productive.

Ms. BRIGHT. Can I say one more thing? Well, one of our things is the accountability of research. We have not had a shortage of dairy, if you want to use the BGH issue. We have not had a shortage of dairy products, of milk. We can produce milk in this country. We had to have a dairy buyout to reduce the supply so our thing with the accountability is why was that research even encouraged or why was it necessary? If that is all it does is increases productivity, we did not need that.

I think we are saying we think there needs to be some accountability in the research. Why was there not more research? Those dollars could have been put on something else that we really needed and I think that is one of the things that we are saying is that the accountability.

When I was at Purdue 20 years ago, there was a friend of mine that said they had research that proved that the carbon in carbonated beverages was detrimental to fetuses, but because that research was paid for by a company that produced carbonated beverages it was stifled. Never got out. And this is, I think, what Mike was referring to, is why do we not let, at least let this stuff out. You do not want to read anymore. I do not want to read anymore. But somebody will read that. Somebody will pick up on those things, and we have a right to know that.

And now I do not know. But the thing of it is if somebody would have reported that, and somebody else needs to come along and do another study. That is what we object to. It is the accountability in the research and what is it going to. Is it necessary for the end use? What are going to do to prove to people that BGH milk is safe?

Especially with this Alar thing, what are you going to do to show them? Would it not be better to have those dollars put on something such as maybe AIDS research that we all see more of a result from than something like this. I think that is what we are after.

Senator DASCHLE. It seems to me that this is one of the examples of what the last panel was talking about with the tail wagging the dog, as you said. It may be in the best interest of public policy that we develop a bovine growth hormone. But I am not sure that was really the question in the debate. The question was we now have the capacity, the ability to expand milk production through the development of the bovine growth hormone, and so how many public funds are available to us to assist in the private development of that product?

And we found public funds to interface with the private funding available, and continued that process. During that decisionmaking process, the question was how soon can we reach our goal of creating that new product, and probably very limited attention from a public policy point of view was given. All right, we have limited Federal dollars. Do these dollars serve us better over here some where with regard to rural quality of life or something like that? There was no decision about that. It was an automatic, "well, the private funds are available. How many public funds can we get our hands on? Where are they? Let us grab them."

And that is the concern I have. The productivity question to me is not as important as that question, the question of how we decide priorities with limited research dollars in the future and how do we commit those dollars in spite of this vast array of opportunities that are out there; and that is what I hope to get at over the year. A better understanding, first of all, of how those decisions are now being made; and secondly, a much better grasp through public policy of how we can better direct those dollar than they are being directed today.

I do not have the answer. I am getting a little bit of an insight this morning. The bovine hormone example may or may not serve our purposes in this regard. But it is illustrative, I think, of what may be something that happens all too often in the determination of where our research dollars go.

Well, I want to thank you both. You have certainly served our purposes this morning here very well. As I said at the beginning your testimony will be submitted for the record in its entirety. You have certainly enlightened us, and I appreciate your time and your attention, and your willingness to come. Thank you, both.

The hearing is adjourned.

[Whereupon, at 11:55 a.m., the subcommittee recessed, to reconvene at 9:30 a.m., Tuesday, June 20, 1989, in room SR–332, Russell Senate Office Building.]

PREPARATION FOR THE 1990 FARM BILL

Mechanisms for Establishing Priorities in Agricultural Research Programs

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TUESDAY, JUNE 20, 1989

U.S. SENATE, SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION OF THE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room SR-332, Russell Senate Office Building, Hon. Thomas A. Daschle (chairman of the subcommittee) presiding.

Present or submitting a statement: Senators Daschle, Kerrey, Cochran, and Bond.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator DASCHLE. This is the second of a series of hearings I plan to hold on agricultural research in the coming year.

The subcommittee's first hearing began with an assessment of the current state of agricultural research and extension. We heard from a variety of witnesses with differing view points indicating both strengths and weaknesses in the current partnerships of Federal, State, and private agricultural research and extension. In that hearing we heard contrasting views on the ability of the agricultural research community to provide outputs that address the concerns of farmers and society as a whole. A primary purpose of today's hearing is to assess the mechanisms available to us for articulating the appropriate priorities and ensuring that the research community does indeed address them.

In the 77th farm bill, the Congress enacted legislation establishing the Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board. These are the principal mechanisms available at the Federal level for setting priorities and we're fortunate today to have witnesses who have been intimately involved in their operation.

In our first hearing a number of areas were identified as being a particular high priority to our Nation as a whole and its farmers. In the 1990's we must undoubtedly focus attention on some of the consequences of earlier productivity organic research. Our amazing success at increasing output and improving efficiency leaves us today with a satiated demand for traditional agricultural products. Alternative crops and alternative uses of both new and old crops including alternative energy sources have clearly been identified as leading research priorities. The unforeseen circumstances of that earlier research into high input production methods has now created a new set of priority needs and research. Sustainable agricultural methods, ground water contamination and food safety are all issues that require our closest attention over the coming decade.

Our first hearing raised some serious concerns about our ability to shift priorities to new resources. The question was raised as to whether the tail is wagging the dog. That is, with constant or declining Federal research dollars available, is private sector money available at the margin dictating the direction of research and land-grant institutions as well as other universities and experiment stations?

Today, I hope that our witnesses will provide further opportunities to explore this issue as we examine the adequacy of current priority-setting mechanisms. We must consider whether there are additional institutional tools that we can employ to help us, and also consider the extent to which we're perceived to have problems in the system and that those problems can be resolved by the current funding levels.

So I really appreciate having the chance to have our witnesses with us this morning. Looking at the agenda it should be a very productive hearing.

Let me call the first two witnesses to the table. Dr. Charles Hess is the Assistant Secretary, Science and Education, U.S. Department of Agriculture, and Dr. William E. Marshall, from Johnston, Iowa, who is with the Pioneer Hi-Bred International, Inc. in Des Moines, Iowa. Dr. Marshall and Dr. Hess, if you could come to the table, we'll take your testimony at this time. Welcome.

Dr. Hess, let's begin with you. Your entire prepared statement will be made a part of the record. You're welcome to proceed anyway you see fit. We are delighted to have you testify this morning.

STATEMENT OF CHARLES E. HESS, ASSISTANT SECRETARY FOR SCIENCE AND EDUCATION, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC

Dr. **Hess**. Thank you very much.

Mr. Chairman, I appreciate the opportunity to appear before you and the members here this morning to discuss the administration's views on current priorities in today's agricultural research programs, and to talk about the establishment of priorities in agricultural research. I have submitted a prepared statement and ask that it appear in the record.

Senator **Daschle**. Without objection, so ordered.

EXPERIENCE AND THE JOINT COUNCIL

Dr. **Hess**. While I have served as the Assistant Secretary for Science and Education at the U.S. Department of Agriculture for only the past few weeks, I have been privileged to serve as the cochairman of the Joint Council on Food and Agricultural Sciences for the past 2 years. One of the major functions of the Joint Council, mandated by Congress, is to assist in bringing about more effective research, extension and teaching in the food and agricultural sciences in the United States by improving planning and coordination of publicly and privately supported food and agricultural science activities and by relating Federal budget development and program management to these processes.

AGRICULTURE, COMPETITION, ENVIRONMENT, AND RESEARCH PRIORITIES

Agriculture is the Nation's largest business enterprise. And, as with any large business enterprise these days, we find ourselves increasingly competing in the global marketplace. And, as with other industries, we must address the growing concerns over potential damage to the environment as a result of the activities of our industry—some of the things that you mentioned in your opening comment. As we go about the job of establishing research priorities, we are confronted with two situations: The need to address the immediate, short-term problems and conditions, and the need to focus on long-term issues, like global climate change would be one of those.

You asked about current priorities in research. Before moving into a discussion of the Joint Council system, I would like to touch upon the systems used by the Agricultural Research Service and the land-grant institutions.

SYSTEMS USED BY THE AGRICULTURAL RESEARCH SERVICE AND THE LAND-GRANT INSTITUTIONS

In 1983, ARS developed a 6-year program plan which strategically outlines priority research directions within the limitations of existing resources. The plan was structured to be flexible to meet changing national and world conditions. These plans are based upon inputs from Congress, the administration, cooperators, sister agencies of the Department, and private sector user and clientele groups. This strategic planning effort has established leadership for the Department in research planning and components of the agricultural system.

The Experiment Station Committee on Organization and Policy, through its subcommittee on Research Planning and Budgets, operates the State planning system on behalf of the State agricultural experiment stations.

When topics have been established and agreed to, directors prioritize the topics in rank order, the results being amalgamated on both the regional and national basis. National research results are passed on to the National Agricultural Research Committee, a subcommittee of the Joint Council, for consideration by the entire Federal-State research system.

Dr. Neville Clark, who is here today, is leading a review of the priorities at a 4-year process, and we are looking forward to their next round of suggestions.

THE FISCAL YEAR 1990 BUDGET SUBMISSION TO THE DEPARTMENT REFLECTS THE USE OF THE PRIORITY-SETTING SYSTEM

The fiscal year 1990 budget submission to the Department reflects the use of the priority-setting system. For instance, Americans are becoming increasingly concerned about quality and safety of the water supply. Our highest research priority is to address this issue. We have proposed increasing the budget for water quality work by $41 million, from $139.9 million to $181.1 million. Of the proposed increase, $13.9 million is provided for a coordinated research program to be conducted at Federal laboratories by the ARS and at universities through the Cooperative State Research Service.

Biotechnology increasingly offers new opportunities to find solutions to difficult problems in agricultural research, in both plant and animal sciences. We consider it a priority to extend the use of biotechnology. One of the areas will be in genetic mapping in the plant area. I might note at this point we have proposed an increase of more than $4 million in the competitive grants programs of the Cooperative State Research Service for plant science research, and an increase of $8 million for animal science research.

Another current priority is the area of food safety research. We have proposed increasing the food safety research by $5 million to reduce bacterial and pesticide residues in meat and dairy products, and research to develop improved animal disease diagnostic methods.

Over the past several years, the Joint Council has expressed concern over the growing shortage of agricultural scientists and recommended that this issue be given priority attention. In particular, the need for increased participation of minorities in the agricultural sciences has been recognized within USDA and the States. A task force of USDA officials and 1890 university presidents made a series of recommendations to strengthen the ability of the 1890's to provide quality graduates in the agricultural and natural resource sciences.

As a result, the Department's budget for fiscal year 1990 contains funding to implement these recommendations.

Mr. Chairman, I cite the budget request as evidence that the priority-setting mechanism, properly implemented, does indeed get results.

CRITERIA AND MECHANISMS THAT ARE USED IN ESTABLISHING RESEARCH PRIORITIES, AND THE DEGREE TO WHICH THESE RESEARCH RESULTS ARE USED

You wanted to hear about the criteria and mechanisms that are used in establishing research priorities, and the degree to which these research results are used.

First, let me establish that the Department relies upon the Joint Council to function as a major source for development of research priorities. It functions in this capacity in cooperation with the National Agricultural Research and Extension Users Advisory Board, which Dr. Marshall has served in the past as Chair, university research organizations' commodity groups, the private sector organizations such as the Agricultural Research Institute, and others in the agricultural research and extension field.

The Joint Council was created by Congress in 1977, and is currently comprised of 25 voting members who represent land-grant colleges and universities, State universities, organizations or agencies involved in programs of research, extension or teaching in the food and agricultural sciences. Members are appointed by the Secretary. The Council is cochaired by the Assistant Secretary for Science and Education and a non-Federal member elected by the Council. Thus, I move from being the non-Federal cochairman to serving as the Federal cochairman.

PUBLICATIONS

There are three principal publications of the Joint Council, a 5-year plan is published biennially, and denotes the issues and challenges and associated goals and objectives of the food and agricultural science and education system.

An annual priorities report outlines the current national emphasis of research, extension, and higher education, and an annual accomplishments report summarizes significant accomplishments of the food and agricultural science and education system.

I would note that copies of these publications are distributed to Congress and we will provide copies for the staff to see what should or should not be incorporated into the record.

5-YEAR PLAN DOCUMENT

It might be helpful to take a quick look at these documents, beginning with the current 5-year plan which was published in May 1988. This publication identifies seven critical areas: restoring a competitive and profitable agriculture, and this would include new product development; revitalizing rural America; maintaining water quality; enhancing the future through biotechnology; advancing knowledge and scientific expertise in agriculture; understanding food, diet, and health relationships; and managing germplasm and maintaining genetic diversity.

In selecting these issues, the Council weighed several factors, including the potential impact on the profitability of agriculture, national needs, relevancy to the needs of the system in the future, and impact upon the general population.

SOME OF THESE ISSUES HAVE BEEN CARRIED OVER INTO THE ANNUAL PRIORITIES REPORT FOR FISCAL YEAR 1991

It is interesting to note that some of these issues have been carried over into the annual priorities report for fiscal year 1991 which lists 5 major goals and 12 priorities. The major goals are: maintaining a safe, wholesome, nutritious food supply; ensuring a profitable, sustainable food and agricultural sector; conserving and protecting natural resources and the environment; enhancing global competitiveness in agriculture; and enhancing regional economic opportunities.

Mr. Chairman, I'm citing the fiscal year 1991 report which is now in the process of being printed. I will provide an executive summary of this document to you for the record.[1]

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[1] This document is retained in the subcommittee file.

THE DEPARTMENT IS CURRENTLY REVIEWING THESE PRIORITY RECOMMENDATIONS WITH REGARD TO PREPARATION OF THE FY 91 BUDGET REQUEST

The Department is currently reviewing these priority recommendations with regard to preparation of the FY 91 budget request. Last week the Secretary and his chief staff officers were briefed on this report. Thus, the process of receiving, reviewing, and establishing priorities is followed by implementation. In my opinion, this is as it should be. As Assistant Secretary for Science and Education, I intend to continue this system. It not only works, but it works well.

The priority-setting system, like priorities, must be able to adapt to change. In this regard, the Joint Council last fall published a document entitled "Continuing the Momentum" which addresses the history, growth, and future challenges facing both the agricultural science and education community and the Joint Council. I am also submitting a copy of this document for the record as I believe it will help the subcommittee understand our priority-setting system a little better. [See page 161.]

THE DEGREE TO WHICH THE ESTABLISHMENT OF PRIORITIES CAN PRODUCE RESEARCH RESULTS THAT ARE USEFUL TO THE U.S. FARMING COMMUNITY

You asked about the degree to which the establishment of priorities can produce research results that are useful to the U.S. farming community. I mentioned that the Joint Council issues an annual accomplishments report. This report reflects well the direct relationship of the research and education community to the farming community.

TWO EXAMPLES

I would like to cite just two examples from the current accomplishments in the current report relating to biotechnology, the first being a report on the accomplishments made in the field of biotechnology. That report notes that research conducted on biological stress is leading the way for genetically modifying corn plants with genes that improve crop protection and lower costs of production.

In the summer there will be experiments in Mississippi in which a gene from a bacteria bacillus thuringiensis has been incorporated into the cotton plant to give it resistance to insects, and this of course also relates to our goal of reducing the impact on the environment from the use of pesticides which affects water quality, food safety, or fiber safety as well.

Also noted in this section is a report on use of recombinant DNA technology to combat crop plants against viruses which could have an immense positive effect on agricultural production in the United States within this decade.

Some very interesting techniques there of using a gene which codes for the protein coat that covers the virus particles, and in order for the virus to replicate that protein coat has to be unwound, viruses sort of have to be naked to reproduce. And so what happens is that when you put the gene in for the protein coat there is a whole bunch of protein coats sitting around the cell, and as soon as one unwinds another one goes right back on top, and so the virus is never naked and can't reproduce.

Senator **Daschle**. Things are the same throughout, aren't they? If you could summarize Dr. Hess that would be great. I failed to mention at the beginning and I will do so now. We are going to try to keep the initial remarks to 5 minutes so we will have some opportunities to talk with each of you. So if you will summarize your statements that will be great.

Dr. **Hess**. We also have reports that come out of the Agricultural Research Service on their accomplishments.

CONGRESS HAS AN IMPORTANT IMPACT ON OUR PRIORITIES

I might also mention, very importantly, that in that there is yet another body which has an important impact on our priorities, and that is Congress. Through hearings, legislation, report language, and communications with Members, we are made aware of the priority concerns of the Congress, which are reflected then in our recommendations.

There are also those priorities which are developed within the framework of the administration of my office. I have asked each of the science and education agency heads to prepare their goals and objectives that we would like to accomplish in the next few years. I have already indicated that one of my personal priorities is to carefully examine the funding requirements for agricultural science and education. There are a number of proposals circulating, including a very important one from the National Research Council on a national initiative for agriculture, research and food in the environment. I have assisted in the development of this proposal and now must look at it in a context of the overall budget picture.

I certainly welcome the opportunity to answer questions and participate in the discussion.

Senator **Daschle**. Very good. Thank you, Dr. Hess. Dr. Marshall.

[The prepared statement of Dr. Hess and the document entitled "Continuing the Momentum" appear at the conclusion of the hearing.]

STATEMENT OF WILLIAM E. MARSHALL, PRESIDENT, MICROBIAL GENETICS DIVISION, PIONEER HI-BRED INTERNATIONAL, INC., DES MOINES, IA

Dr. **Marshall**. Thank you Mr. Chairman. I have submitted a written statement and I would like to paraphrase it if I may, sir.

Senator **Daschle**. By all means the entire statement will be inserted in the record in full and we invite you to proceed.

Dr. **Marshall**. Thank you, sir.

INTRODUCTION

My name is William Marshall. I'm president of the Microbial Genetics Division of Pioneer Hi-Bred International in Des Moines, Iowa. The Microbial Genetics Division utilizes microbiology to produce products of benefit to agriculture. Pioneer Hi-Bred is the largest independent seed corn company in the world.

For 5 years I served as Chairman of the National Agricultural Research and Extension Users Advisory Board—whose authorizing legislation required two reports to be written per year and submitted to the administration and Congress—and for 3 years I served on the advisory panel of the Office of Technology Assessment on New Developments in Biotechnology. That panel authored five reports. Part of all of them have to do with agricultural biotechnology. At present I serve on the Advisory Committee on International Property Matters to the GATT.

PRIVATE SECTOR'S VIEW OF THE CURRENT PRIORITY MECHANISMS USED

First let me say that no one who has taken the time to study the agricultural research programs of the United States has any basis for criticism.

THE CRITICISM THAT I HEAR TODAY FROM THE PRIVATE SECTOR, AND I WOULD SAY IT IS FAIRLY GENERAL, IS THAT THE PRESENT PRIORITY-SETTING MECHANISMS AND FUNDING PROCEDURES MAY NOT PERMIT THE CONTINUED HIGH SUCCESS RATE OF OUR TRADITIONAL AGRICULTURAL RESEARCH SYSTEM

However, the criticism that I hear today from the private sector, and I would say it is fairly general, is that the present priority-setting mechanisms and funding procedures may not permit the continued high success rate of our traditional agricultural research system. The scientists and administrators in our public research establishment would like to say, "We did it before and we can do it again." There are, however, some genuine misgivings about the traditional establishment's ability to do that in the future. By traditional agricultural establishment I mean those organizations funded by Science and Education of the USDA, namely: CSRS (Cooperative State Research Service), ARS (Agricultural Research Service) and CES (Cooperative Extension Service).

BASIS FOR THIS CONCERN

The basis for this concern is the result of changes in the world external to the traditional agricultural research establishment which have not been met by changes in ARS, CSRS, and CES. The people in these organizations are just as good as they always have been. The system can be just as proud as ever of its achievements. But the concern rises from the knowledge their external world has changed.

One, we have serious competition from overseas, especially from foreign nations with deep pockets to match our subsidies.

Two, we have a growing need to protect our environment for future generations of Americans.

Three, we have come "eyeball to eyeball" with a new science and technology arising from a better understanding of the molecular genetics of animals and plants.

The present system with its present priority-setting mechanisms can handle No. 1, especially by working with other organizations within the USDA. For example, the Economic Research Service, or ERS, but it has a difficult challenge with No. 2 and No. 3. The system has some capability to handle acid rain but lacks a sufficient science base to tackle ground water pollution or sort out the potential of molecular biology.

To make the situation even more recalcitrant to change, we have structural hurdles to overcome. Most of our colleges of agriculture do not have the basic science departments that will be required to adjust to the new fundamental technologies of molecular biology that are coming out of our colleges of arts and sciences. Likewise our ag students will not find jobs as readily in agricultural research as they have in the past without this training. Even today, almost 50 percent of the Ph.D's working in agricultural research did not graduate from a college of agriculture.

QUESTION OF PRIORITIES

But to the question of priorities, I would respectfully submit the following:

One, we need low-priced technologies to match the low prices of commodities.

Two, we need technologies that are at least environmentally friendly, if not regenerative.

Three, we need technologies that are size neutral.

Four, we need basic science curricula that will expand the knowledge base of our ag students.

Five, we need alternate crops.

NEW THINKING

To pursue these five priorities will require some new thinking by the organizations funded by Science and Education. It will require some new linkages, new recognitions, and new tools. Today, 50 percent of the Federal Government support for agricultural research does not flow through the U.S. Department of Agriculture. It flows into agricultural research through the other granting agencies such as the National Institutes of Health, the National Science Foundation, the Department of Energy, the Department of Defense, et cetera. Agricultural research is now being conducted at private universities, and in colleges other than agriculture. We need to recognize that. Therefore, new linkages need to be made.

DIFFICULT TO FIND FUNDS

It appears that it is difficult for most of our State agriculture experiment stations to obtain Federal funds from agencies other than the Department of Agriculture. Only 9 of the 57 State ag experiment stations receive more than 10 percent of their total funding from agencies outside the USDA. And more than one-third receive less than 2 percent of their total funding from agencies outside the USDA. This appears to be a consistent funding over the last 5 years.

And finally, also, since more than 40 percent of the Ph.D's engaged in agricultural research today did not graduate from colleges of agriculture, it is apparent that the colleges of agriculture themselves are no longer the only seat of research and education for agriculture. Likewise, the faculty of our colleges of agriculture must recognize that good research for agriculture is being conducted by people outside of their faculty and by people who are not graduates of their colleges as well. These men and women are using new tools not generally found within the colleges of agriculture to pursue their research.

For the best usage of time, Mr. Chairman, I would like to stop there. Thank you.

[The prepared statement of Dr. Marshall appears at the conclusion of the hearing.]

Senator **Daschle**. Well, Dr. Marshall, you've enlightened us and I appreciate your comments and many of your observations. It's an excellent statement and I think it was very appropriately relevant to some of the things that we are talking about this morning.

Dr. Hess, you were madly writing as Dr. Marshall was commenting. Before we open it up to questions I would like to get a little discussion. To me that was somewhat of a provocative statement, but nonetheless I find myself somewhat in agreement with many of the things Dr. Marshall said. How would you respond to that?

Dr. **Hess**. I guess I feel I would have to disagree with the observation that we will not be able to respond as well to the environmental, or the opportunities from new science thrusts. As I have described we do have a major initiative plan for water quality improvement, in fact I will be testifying tomorrow on that topic. In terms of the area of molecular biology, I served on a committee on biotechnology for the last 8 years, at least ever since its conception, and one of the things I have been doing is conducting a study of the investment that land-grant colleges have made in biotechnology research. And there has been a rather dramatic shift, both in terms of the number of people and in dollars, that have gone into biotechnology research. And that shift really was a redirection which people have said in the past that the agricultural experiment stations cannot do, because the number of scientists in the experiment stations remain fairly constant from the period—in fact decreased a bit from the period beginning in 1982 to 1986. The 3 years I have data on. Now currently getting the data for 1988. In that period, as I said there was a dramatic increase in the number of scientists working in biotechnology, the number of projects, and the number of dollars.

Senator **Daschle**. Dr. Marshall, Dr. Hess just said that in a sense what you are saying is already being done. How do you respond to that?

Dr. **Marshall**. I think we are talking about relative amounts of quantity and quality of effort. I'm familiar with Dr. Hess's work on that committee for the past, as you said 6 or 7 years, and that was a worthwhile effort. I would say however, two things. One is it required that kind of an effort to get that going, I mean the leadership had to come from Washington, or from Florida in the particular case, as well as from California.

So it was not something that was seen by the entire organization as something we ought to do. In fact agricultural biotechnology came as rather a hard sell to the entire land-grant college of agriculture system. And secondly, I would say that the increased funding by the land-grant universities is correct and is justified, but that does not necessarily mean that the research is being conducted by colleges of agriculture within the land-grant university.

Within any university there are more than just walls made of brick and mortar for buildings. There are walls between colleges, and between departments, and so forth. And a lot of that truly good research is being done at the land-grant universities, but I would submit that perhaps not most of it, but I would feel that most of it is being done outside the colleges of agriculture. So what needs to be done is to establish a linkage outside the college of agriculture into these other colleges and into these other departments.

Senator DASCHLE. Do you agree with that Dr. Hess?

Dr. HESS. Well, again I have to base my experience on what we've done at the University of California, at Davis, and all members of the biological science departments at Davis are members of the agricultural experiment station.

Senator DASCHLE. But that isn't the case nationwide, not by a long shot. You do not have that situation even in the Midwest where it ought to be a lot more prevalent. It is just not happening. Why isn't it happening there and what can we do from here to see that what happens at Davis is happening nationwide?

Dr. HESS. Well, I think one way is to increase the availability of funding for multidisciplinary research. That is have as a criteria that it is multidisciplinary somewhat like the McKnight Foundation grants which were setup large enough to attract a team of scientist long enough to get that team to really be functioning and working effectively. I think that is a very powerful tool that we've used really, you do need a carrot and you can get people to work together across departmental lines, across college lines. It does require some inertia, I certainly agree with Bill Marshall that it's not something that will just happen by itself, and one way is providing some additional funds as is being proposed by the initiative developed by the National Research Council.

Senator DASCHLE. I want to talk to you about priorities in a minute, but in order of arrival I want to call on Senator Bond for whatever questions he may have, or comments.

STATEMENT OF HON. CHRISTOPHER S. "KIT" BOND, A U.S. SENATOR FROM MISSOURI

Senator BOND. Thank you, Mr. Chairman. Very briefly a quick comment and question I am going to toss up in the air because I have a commitment to be on the air at 10 this morning. So I will have to leave soon.

I was very interested in the priorities that were listed by our two distinguished witnesses. I think it is very important we talk about these priorities. What troubles me is within Dr. Hess's statement, you at one point see the human capital needs, the agricultural research and education needs, and then the next priority list they may fall out and then another priority listing, they're in, then they're out.

Food safety research I think is very important, we talked about biotechnology, new crops, and new uses, but I am very much concerned that we are going about this in a scatter gun approach.

We can talk about it in this committee, and then the Appropriations Committee does something else, very often not a competitive research grant, but a specifically targeted grant, and for the record I would appreciate if both Dr. Hess and Dr. Marshall could comment on recommendations they have to make the system work better. The land-grant colleges can have all the ideas they want, the USDA can make all the recommendations they want, but it is what Congress appropriates that is going to be done.

So, pardon me for asking a question and departing, but I would like to be able to come back and review your comments on how you think we can do a better job of seeing that the needs that are identified by the scholars and professionals in the field are really turned into available dollars for research. We must establish some well defined priorities.

I feel that we have a lot of interesting things out there, but we are not going to make the kind of progress we need unless we have a congressional, administrative, private sector agreement that there are a couple or three priorities. I have my own views, however I think a system of getting an agreement, so we can focus on a list of priorities is of most importance. This is even more important than anyone's particular views on what should be the priorities.

With that gentlemen I thank you for your comments and I'll look forward to hearing your answers.

Thank you, Mr. Chairman.

Senator DASCHLE. Senator Bond, I think you're absolutely right. In fact after we get over this oversight part of the session, I would like to get into that. I think we have to have a little more unified appreciation of research, and your comment is well taken.

Senator BOND. I look forward to working with you on it, because I think that is the key. We can go off in all directions like the puppy trying to follow 10 kids home from school every day, and winds up lost. Our research efforts can be lost, if we don't focus on one or two kids to follow home. Thank you.

Senator DASCHLE. I am sure we will have both of our witnesses back for that portion of the session as well. They both could share some things at that time.

Senator Kerrey.

Senator KERREY. Dr. Hess, I do have a great deal of admiration for the work that you did at Davis, and we have talked about some of our shared friends out there. Could you specifically look at the priorities that Dr. Marshall listed there on page 2 of his prepared testimony? [2] Do you have that available, is that one of the things that you were scratching out? [Laughter.]

And I do have to get the text of your remarks on those naked viruses. I do.

Dr. HESS. Senator Kerrey, on page 2——

Senator KERREY. On page 2 Dr. Marshall lays out five priorities, and I know you must be about at the edge of developing a new 5-year plan.

Dr. HESS. Yes, as I mentioned earlier that process is being initiated. In fact, there was a conference sponsored by the Experiment Station Committee on Policy this past week in which some of the background information is being laid out to begin that process of reviewing them.

Senator KERREY. May I say this, I like these priorities. I almost, for the moment at least, accept them just as they are. Let's assume that I would make some alterations in it at some later point, but for the moment do you like these five priorities?

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[2] See printed page 179 for Dr. Marshall's priorities.

Dr. HESS. Well, I think that there is general agreement, in other words I would say that our goal of increasing our competitiveness is directly tied to the idea of low price technologies. So that you can then be more efficient, and more competitive. In terms of environmentally friendly technologies, certainly our whole thrust on sustainable agriculture using biotechnology to try and get genetic resistance to insects and pests, so we can decrease our dependency on the use of agricultural chemicals is right in line with that.

Senator KERREY. Do you agree with the statement just one or two paragraphs after that, that biotechnology typically is not a low priced technology?

Dr. HESS. No. For example, if we are able to, and have been successful in incorporating the gene from the bacillus thuringiensis which produces a protein that is toxic to a certain class of insects, and if scientists have been able, both in the private and public sector incidently, both playing very important roles, have been able to incorporate that gene into tomatoes and into cotton. And so those plants now have resistance to that particular group of insects. That means that the farmer does not have to use pesticides to get that control, which means a substantial reduction in cost.

Senator KERREY. But you're describing a situation where the technology is being developed by somebody who is familiar with agriculture. How about a situation where the technology is being developed by somebody who is not familiar with agriculture?

Dr. HESS. You mean, say in the med schools, or something like that?

Senator KERREY. In the med school, or the school of arts and sciences where it is not connected to the land-grant college, to the college of agriculture.

Dr. HESS. Well, let me say that our view has been to try to encourage scientists across the spectrum of universities to do research that we can actually utilize. In other words the competitive grants program is open to scientists in private universities, in med schools and so forth. And some of the basic work that we're using now was developed in medicine and is now being used in agriculture. I think that is fine, I have no problem at all with that. What I do like to see and to encourage is a team approach by using an agricultural scientist, a scientist from say biochemistry and biophysics, who may or may not be in the college of agriculture. A molecular geneticist, again who may or may not be in agriculture.

In my own particular case what I've done is added, for example, faculty who have been trained in molecular biology to our mission oriented or crop oriented departments. So that for example, in the case of cotton we have a molecular biologist work with a plant breeder. The plant breeder knows the crop, knows the characteristics that would be very important in terms of agricultural productivity. The molecular biologist has the techniques of cutting and splicing, and that team then produces the results that which then can be applied to agriculture.

Senator KERREY. Do you think the technology should be size-neutral?

Dr. **Hess**. Well, my feeling on that is that the size-neutral is a bit of a red herring. Ninety percent of the research that we do is size-neutral. That is if we develop a disease resistant or insect resistant cotton plant or tomato plant, that benefits a farmer of whatever size, or even a backyard gardener, who it may also be an important source of contamination of the environment.

Senator **Kerrey**. Do you mind if I ask Dr. Marshall if he agrees with that?

Dr. **Hess**. Sure.

Dr. **Marshall**. I think that size-neutral also encompasses skill neutrality. Large farmers are usually more skilled than a smaller farmer. So in the particular technology that Dr. Hess mentioned he's absolutely right. If you sell a crop, or you sell a seed that has the potential all you have to do is plant it, and anyone knows how to do that. But, my concern is that we talk about size-neutrality without really looking at farmers that are very small, or farmers that are very large and sophisticated. And so the size-neutrality includes skilled neutrality, and I think some of the new technologies are not necessarily skill neutral.

Dr. **Hess**. I guess my response to Bill's comments would be that we have to develop a system which is sensitive to the limited resource farmer. For an example, again the example that I've used at Davis is that we have what is called a small farm information access center, where we package information so that it can be used by people who do not have extensive training. However, in terms of our Nation I felt it is important that we do the research that makes us as efficient as possible in our production systems as well as being environmentally responsive, and that we then mitigate those technologies which could be benefiting or more readily adapted by larger farmers, by providing training, so that the smaller operator can, in fact, use them.

I don't think that you should stop research because it might benefit one class, or size of farm operation. I think we have to be able to get the best production capability, the highly most efficient production capability regardless of size. But take into account that there are technologies which could have an adverse effect on a particular group, and then develop techniques to mitigate those adverse effects.

Senator **Kerrey**. One last question Mr. Chairman. I would observe that in order to at least come close to neutrality that you're going to have to act very affirmatively with the smaller operator. I'm not talking about the part-time operator, I'm not talking about somebody with $50,000 worth of receipts that essentially does it on the weekends, or a little bit. But, I'm talking about someone in the $100,000 to $150,000 range. You're going to have to act pretty affirmatively because of the skill level that Dr. Marshall asserted, and because of the relationship that they're apt to have with the land-grant colleges.

It is not apt to be a relationship of great influence, it is not apt to be a relationship that can turn research in and of itself. I mean I've suggested that the college is going to have to act in a very affirmative way to get that job done. I'm not sure they have the capacity to do that, and Dr. Marshall, I'd like to—you've listed on page 3[3] of your prepared testimony—your small typed single page—single space testimony, that pushed me hard. That to pursue these five priorities, actually to use the correct verb, you don't even suggest that we're actually going to accomplish the five priorities, but we're just going to pursue them. We're going to pursue those five priorities, it's going to require new thinking by organizations funded by science and education. Not an easy thing to do, to get anybody to think in a new way. I mean it's not easy to get me to think in a new way, let alone—it's much easier for me to talk about getting you to think in a new way, than it is to get me to do it. New linkages, which I don't quite understand, new recognitions, which I don't quite understand, and new tools, which I don't quite understand as well. Can you spend a little bit of time on each one of those, just to give me some idea of what we're talking about?

Dr. MARSHALL. Surely. The new linkages is just what we're talking about here, and that is linkages between let's say traditionally trained agricultural researchers and the new agricultural researcher. I don't want to say new in a promotion sort of a way, but I mean there is a new wave of agriculture research people that are not trained by our colleges of agriculture. We need to link in with them. I would certainly endorse what Dr. Hess has suggested about multidisciplinary awards for these people. I would make certain that they are in two different colleges. To put that linkage across the university, and between universities, and not necessarily just between land grants, but with private universities. It doesn't make any difference wherever the skills are.

The new thinking, I think we have to realize that subsidies can't go on for ever. That we have to be concerned with the cost of inputs. In my prepared statement, I didn't read it aloud, but in my statement the research indicates that it now requires that a farmer have an additional 22 bushels of corn, or soybeans to pay for the new cost of inputs.

Senator KERREY. Over a 10-year period. Is that 1976 to 1985?

Dr. MARSHALL. Yes. In that period it escalated 22 bushels an acre just to pay for the additional cost of input.

Senator KERREY. And I think you're right. Most people would say they were pretty high in 1976.

Dr. MARSHALL. Absolutely, and unfortunately the records don't go back prior to 1972. So we can't get them before OPEC, but I think that is the kind of new thing that we can't simply say well, it's going to cost this much to increase the inputs but what's the difference because the commodity prices are going up, the Government subsidies will take care of that, so we're just going to do this. I think that is a kind of new thinking. Another kind of new thinking is that our ag researchers are not just people coming out of our colleges of agriculture. They're coming out of all sorts of basic science departments from all kinds of universities. The new thinking is also that if you look at our State ag experiment stations, there are 57 of them across the United States and they are not monolithic by a long shot, and I think this is one of the reasons why we don't have a unified approach and we probably never will. Because the capabilities of these 57 institutions are quite different.

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[3] See printed page 180 for the prepared testimony referred to by Senator Kerrey.

Senator **Kerrey**. Should they be monolithic?

Dr. **Marshall**. No, I don't believe they should be. I don't think they should all be like Dr. Hess's alma mater which I think is one of the real citadels of higher education in agriculture, but we have some that clearly ought to be brought up. I mean they are lagging way behind. So I think it is a lot of times human nature not to believe something not because it isn't a fact, but because you can't cope with it if you say that is correct. And what I sense, or a lot of what is going on is many of the schools that are not so well trained, or not so well positioned to take advantage of new money outside of the USDA, are saying I don't believe that, because if they said I believe that, then they would say I can't cope with that, because I can't go and get that money.

So I think there is a lot of that in the system. It's not so much I reject your objectives because I don't believe them, it's I reject those objectives, because if I agreed with them I would have a hard time competing for the funds to do that kind of research. So I think that is the kind of new linkages and new thinking.

Senator **Kerrey**. What about new tools?

Dr. **Marshall**. And the new tools I think are those that come out of biotechnology. Not necessarily just genetic engineering, gene splicing, and moving genetic material around, but a whole field of molecular biology, and what it is providing us with, an understanding of what goes on within animal and plant cells. That is what needs to be utilized, and we are doing that. Diagnostic aids, viral detection, infection, detection, and all these sorts of things.

I don't mean to overstate this, but at times I just think that we're just getting carried away with moving genes about, rather than why what is this whole field that we have, and what else is there in here that perhaps can be used tomorrow, without upsetting a lot of public opinion, and regulatory agencies. That is cheaper, readily adaptable, and let's go and do it. It might not be as sexy as some people would like it to be, but it does the job and does it quite well.

Senator **Daschle**. Dr. Hess.

Dr. **Hess**. One point I want to certainly agree with in Dr. Marshall's comments, and that is the need to upgrade the capability of some of the agriculture experiment stations. Not all have had the opportunity to develop as other universities. They're certainly not monolithic, and they shouldn't be because they also are relating to State needs as well as national needs. But in the proposed initiative that the National Research Council is working on is a component for strengthening grants that help those universities improve their capability to compete for competitive grant funds. And I think that that is an important thing, and I'm going to certainly endorse Bill's observation on that.

Senator **Daschle**. That leaves me to ask a question that I really think Senator Kerrey asked and didn't get the answer. Maybe you gave it to him in a roundabout fashion. But in as direct a way as possible, what do you think of the five priorities that Dr. Marshall outlined? Do you support all five? Just right down the line without any editorializing, if you——

Dr. HESS. Let's make some policy here this morning, should we. [Laughter.]

Senator DASCHLE. I mean do you have any difficulty with any of the five as you see them?

Dr. HESS. I guess the only one that I had a little bit of difficulty would be on No. 3. We need technologies that are size-neutral, and I would say that that is a good goal. I would not want that to be interpreted to say that we would not develop size technologies that are not size-neutral, and then I had the caveat that if it turns out that it is not size-neutral then you should mitigate the adverse effects of its lack of neutrality. But to answer your question specifically I have no problem supporting the five priorities that Dr. Marshall has here.

Senator DASCHLE. Well, we have had, the last hearing and this hearing, we have had three witnesses, all of whom representing three different elements, but together there are probably now about 35 priorities that I have been given as what ought to be agricultural priorities. And, you know it defies the term priority to have that many. What is not on the—I'd be embarrassed frankly if I weren't on one of these lists. And I'm concerned from what Senator Bond said, he must be too, that we are not prioritizing at all. In a sense we're laying out this buffet here, it's like somebody walking into a store and saying "I'll take one of each," that is my priority. Where is the priority? You've just endorsed Dr. Marshall's priorities, but would you add them on, would you subplant them, what would you do? Would you put them as a higher set of goals than what you've given me? Where do they fit?

Dr. HESS. Mr. Chairman, as I pointed out in response to Senator Kerrey's question, I feel that the priorities that Bill has listed are not different from the priorities that I have listed. In other words, I can take them and match them up. Now, also, I would say that——

Senator DASCHLE. In other words you could take your 12 and put them into his 5. That is getting—we are making improvement on them.

Dr. HESS. Or I could take his 5 and put them into my 12.

Senator DASCHLE. We've already lost seven.

Dr. HESS. Yes, yes. I could do that.

Senator DASCHLE. Dr. Marshall, would you share that view?

Dr. MARSHALL. I think, I agree with you a 100 percent about what you say about priorities. A long list of priorities don't do it for anyone, and I think the shorter the list, the better. But, I start to worry as the list grows because then caveats are thrown in and there are some modifiers, some adjectives are put in that kind of allow everybody else to sneak in under the umbrella. I think there is plenty of money out there from the private sector and from the States that can take care of any kind of priorities there, that are State or private sector-rooted. But, I think that Uncle Sam needs to have a list of priorities that are not all encompassing. They don't have to apply to every State in the Union, and every condition, but at least some leadership that allows universities, and organizations to step up and say, well, I would like to follow this list and take that up to the dean, or the president of the university or whatever and have a talking piece about it.

Senator **Daschle**. How much do you think we're either placating or patronizing constituencies with our priority list today?

Dr. **Marshall**. It is hard to quantify an answer, but I think quite a bit. If one considers the constituency is not only the trade associations, if you will, the commodity associations, but also faculty that are capable of doing a certain kind of research and we can't get them off of that, because they need to be retreaded and redirected and so forth. We also have a great number of people in Congress that believe they know what it ought to be and they want to put in line items for this particular research.

So there are many, many constituents out there, and I would say that they drive just about all of them.

Senator **Daschle**. Last question. We could go on with this panel alone the whole morning, and it wouldn't do justice to our other witnesses, but I really appreciate this. I've learned a good deal. Let me ask you about the Joint Council.

The sense I get is that No. 1 they're probably not as representative as they should be, and No. 2 using your criteria for success, that is let's start thinking new, there probably isn't a whole lot of new thinking on the Joint Council. In your assessment is that a correct appraisal of the Joint Council, or is that too harsh?

Dr. **Marshall**. Well, since I started to serve on the Users Advisory Board, which is the sister board to the Joint Council, I've seen a lot of changes and improvements. And in all humility I would say that. And far more changes on the Users Advisory Board side. And there were far more changes needed.

Senator **Daschle**. So you're satisfied?

Dr. **Marshall**. No. One should never be satisfied, and I'm not satisfied with the makeup of the Joint Council. I think that they should have membership that comes from other agencies of the Federal Government, some top individual people. There should be less concern about having a political balance, I don't mean that in a national sense, but we don't have to have every region represented, and every crop represented, but let's get representation from people who really can think these matters through.

Senator **Daschle**. Dr. Hess, do you have a response to that, any comment? Are you satisfied with the Joint Council? You haven't been in your position that long to really have much influence with regard to the direction the Joint Council might take, but what do you think?

Dr. **Hess**. Well, I think it has come a long way in terms of trying to achieve one of the goals that you've suggested, that is produce a coordinated priority list. And that had not been done before, because you would have the experiment station side, the extension side, the resident instruction side. So I think that that is coming along, it's a maturing group. It has, I think, a lot of potential. It has more work to realize its full potential, and I would like to work on that in my term of office, to really make it and achieve the goals that you are expressing.

Senator **Daschle**. If you could describe what you would like to see as the Joint Council, different from what it is today, a year from now, or 2 years from now. How would you describe the difference?

Dr. **Hess**. Well, I guess I would like to see that when we come up with a set of priorities that this represents the Nation's priorities, and then I would like to see that expressed in research programs that are addressing those priorities, and in results that have provided answers to the problems that were identified as being the top priorities.

Senator **Daschle**. I guess I would only caution, you've used the term priorities now three or four times in the same sentence in response to my question, for good reason. But again, I think we over use the term priority and I'm the least expert of anyone in this room, but I get real weary of hearing about priorities in this business. We hear about it all the time, and the more we talk about it, the less it takes on a definition, or a significance. I think of all the different things I've had to address since coming to the Senate, this seems to be a prime example of that.

Senator Kerrey.

Senator **Kerrey**. Just one final question, Dr. Hess, and I need to lead into it with an observation about the legislative branch, because I'm going to say something that might sound a little critical to the executive branch. We are almost by definition an undisciplined body. We're 535 Representatives and our measurement of whether or not a project is worthy is often whether or not it is in our State, or in our legislative district. I mean if it's in my CD, I'm for it. If it's not in my CD, I'm not for it. Now we'll put little groups together and demonstrate the capacity for regional cooperation from time to time, but it is often difficult for us to adhere to priorities that are outside the absolute priority of getting 50.1 percent of the votes the next time around. It isn't quite that bad. We have the chairman here, for example, who's talking about driving us to develop better objectives.

This problem is why the legislative branch needs the executive branch to propose fairly clear statements. Particularly given all the changes that are going on in the world, and they are enormous, enormous. Not just the changes cited by Dr. Marshall, but others that I would add to the list that I think impel us to do things differently.

In that light, the person that is going to follow you, Dr. Benbrook with the National Research Council, has in his prepared statement, this statement, and I would like to have you tell me if this is right or not. He says, "In recent years the three USDA research and education agency heads and planning staff have rarely gotten together to plan, discuss, and coordinate their budget requests prior to the submission of agency budgets to the Assistant Secretary for Science and Education."

Are you going to correct that, or do you disagree that it needs to be corrected?

Dr. **Hess**. I feel that there needs to be coordination and I will correct that.

Senator **Kerrey**. I think it's terribly important, I really do. I think you're going to have a friendly audience here. Senator Daschle's identified this as an awfully important effort, but we are going to be cutting against the grain; the grain that I referenced earlier, the political grain. Many people kind of like it the way it is right now. I really think that in the next half-a-dozen years we need to challenge ourselves pretty substantially as to where we are applying our research and for what purpose. Otherwise we're apt to be like rats in a maze and have a difficult time finding our way out.

Senator DASCHLE. I endorse that entirely. I hope that as we go through the next few months that we will have the opportunity to consult with you further. This is just the opening shot, and you have a lot to offer us in terms of your experience, and certainly, your philosophy. I think the combination here has been a very excellent one, and we appreciate both of your contributions this morning.

Dr. Hess and Dr. Marshall, thank you.

Our next panel includes Charles Benbrook, the executive director of the Board on Agriculture, National Research Council, Michael Phillips, the Office of Technology Assessment, and John Harman, of the GAO. If those three gentlemen could come forth. Gentlemen, thank you for coming. We would like to invite you to present your testimony. Obviously, as you heard me say, the entire text of your prepared statement will be inserted in the record. We would like you to keep your opening remarks to 5 minutes so we can get into some dialog afterward. Dr. Benbrook let's begin with you.

STATEMENT OF CHARLES M. BENBROOK, EXECUTIVE DIRECTOR, BOARD ON AGRICULTURE, NATIONAL RESEARCH COUNCIL, WASHINGTON, DC

Dr. BENBROOK. Thank you, Mr. Chairman.

LET ME BEGIN WITH AN IMPORTANT POINT THAT WAS RAISED WITH THE EARLIER PANEL, AND THAT IS YOUR CONCERN ABOUT THE SYSTEM BEING ABLE TO RESPOND TO PRIORITY AREAS OF RESEARCH

Let me begin with an important point that was raised with the earlier panel, and that is your concern about the system being able to respond to priority areas of research. You raised the question what structural problem or institutional problem does our current system have in responding to new priorities? I think in an era of, if not level funding, perhaps even modestly increasing funding with all the changes in the world, it's going to be very difficult to respond with the kind of programs that we have today because of our current funding mechanisms. And you asked well, "Shouldn't we just have four priorities?"

I think it is very important to keep in mind that while there probably are three or four priorities in say three, four, or five areas that certainly are the most pressing challenges that the country faces, there are still going to be a lot of routine areas of research that have to be ongoing to meet the needs of the food and fiber system. So really what you have to begin to think about is developing in the system the capacity to have part of the Federal research dollar and programs freed up and capable of responding to emerging priorities very quickly, and this capacity will need a big enough part of the total funding to really make a difference, while preserving capacity to respond to ongoing needs. I think that what you will find is as you pursue these hearings is that because of fiscal austerity over the last several years, and the other budget pressures that the Department of Agriculture has faced during the 1980's there really hasn't been the opportunity to develop the capacity to put new Federal money into the system so it could respond to some of the new priorities.

In a range of our reports, and I list 12 that we have done in the last 4 years that address a range of research policy, environmental, conservation, food safety and nutrition issues, each report contains a set of research recommendations that relate either to substantive and technical priorities, or to programmatic needs. And I would offer the overall judgment that three or five factors routinely contribute to the ability of the Department and the system to respond.

First of all, there is a tremendous about of progress going on in science. It's a very exciting era when biotechnology, new engineering developments, et cetera, have opened up many new ways to address old problems that we face in agriculture, and there just hasn't been much new money to put behind these new exciting, dynamic areas. And because our current system as it's structured does not have a high degree of flexibility to redirect money, because of personnel policies, because of funding mechanisms. This is true despite enumerable statements of priorities that everyone agrees with. There is limited opportunity, or ability to put money behind new priorities. So statements of priorities are a dime a dozen. How does the allocation of money actually change?

We have been working for a year or so on a major national agriculture research initiative. I might mention, Mr. Chairman, that this initiative is related to one of our major reports: "Agricultural Biotechnology: Strategies for National Competitiveness." This report came out in 1987, and contains a recommendation for a $500 million increase in competitive grants targeted to exciting new biotechnology. The study committee that we convened to do this report was chaired by the distinguished and capable deans of the College of Agriculture and Natural Resources at Davis, California, who now happens to be our new Assistant Secretary for Science and Education. So we'll be working with Dr. Hess to try to implement the report that he wrote.

In the context of analyzing where we stand in agricultural research, the Board asked itself the question where has the money gone? What areas of research, what programs, over the last 8 fiscal years have had more than a 5 percent change in any one year in budget levels, either up or down? And then we analyzed why has Congress shifted spending priorities in these areas? Who's recommendation were they following? And I would urge the committee in its investigation to—working with the budget staff, and with the Department, and with GAO—to basically formalize the analysis that we did, because I think you're going to find some rather surprising results.

You will learn that it generally takes 2 or 3 years for a top priority item in the Joint Council in UAB cycle, often before there is any discernible change in the money appropriated by the Congress, and sometimes not even then. In fact, rural economic development and diversification popped onto and off of the top 10 chart with nary any sign that anybody paid any attention. And it wasn't until the third or fourth year of water quality being either No. 1 or No. 2 that there was any discernible response in the executive branch budget process. And let me in closing set the stage for the appropriation markup which is about to begin. Senator Kerrey will have the opportunity to watch how this scene plays out.

Senator KERREY. Believe me we'll do it in an enlightened fashion, too.

Dr. BENBROOK. The executive branch, after several years of recognizing water quality as a major priority, has come up with a request for a substantial funding increase. New money, $41 million spread across the Department for water quality protection. Leading Members of Congress have identified this $41 million as a source of funds to provide an $11 million increase in the LISA Program, $20 million increase in biocontrol, and maybe leave a little bit for water quality.

So we will all witness as the Congress moves ahead with the 1990 budget markup, evidence of the difficulty that the Congress faces now in responding to very strongly felt, clear, major national needs. Water quality protection, safer ways to control pests, sustainable agriculture. Those needs are all profound and deeply felt. The Congress is going to respond, but the mechanisms that you have to respond now tie everyone's hands and are really threatening both the credibility and the performance of this system in a very profound way. So I hope that your efforts will lead to a more overall solution to the problems this country, and the agriculture research system faces in meeting the priorities with real dollars. Thanks.

Senator DASCHLE. Thank you Dr. Benbrook.

[The prepared statement and attached addendum (a list of pertinent NRC reports) of Dr. Benbrook appear at the conclusion of the hearing.]

STATEMENT OF MICHAEL J. PHILLIPS, Ph.D., SENIOR ASSOCIATE, FOOD AND RENEWABLE RESOURCES PROGRAM, OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, DC

Dr. PHILLIPS. I have my prepared statement that I will submit for the record, and let me just amplify on a couple of points.

RESEARCH PRIORITY SETTING

Some of the areas that have already been mentioned here by yourself and others I have covered as well as we look at this whole research priority-setting process. You asked what our Office has done over the past decade or so, the kinds of research priorities that we've laid out in various studies, and how the system has responded, and I've summarized those in the first part of my prepared statement. Basically I think that you can say that as you look back as to how research agencies have responded to our findings, that it's a mixed bag.

In some cases, such as work that we did in the late 1970's, that resulted in competitive grants being implemented within the Department, I would say that the system's response to that was fairly rapid. We did see competitive grants come on the scene quicker than many of us might have thought. But in areas that Mr. Benbrook and others have mentioned that relate to investigating alternatives to present agricultural practices because of our concern about the environment, food safety, and the like, those have been on and off the research list, now and again, and the system has been slow to respond. We're seeing here in the late 1980's, in some cases 10 to 15 years after they were first identified as high priority areas that we're beginning to move into these areas. So it is a mixed bag as you look at this whole system.

FEDERAL SUPPORT

When you look at the priority-setting process many of the points that have been made by the previous panel in terms of what has happened to the Federal support are important. It's a concern that I think we can't overstate enough, because we do have what Congress formed back over a 100 years ago, a Federal-State partnership that over the last 25 years, at least the Federal portion of this has not been a true partner. And if you can look at just the last 10 years in particular we've seen the Federal support decline by at least 15 percent, and States have had to basically make up for this difference. And we've come to a point where I think States are saying, "We probably can't do much more than we have." We're going to reach a stalemate here fairly soon. And so I mention that only in passing in terms of what happens then when you try to establish priorities, because in this type of an environment, Federal funds as they continue to decline to establish and then implement national research priorities, it becomes difficult within this type of a Federal, State partnership.

WE SEE THE PRIVATE SECTOR BECOMING MUCH MORE INVOLVED

We see the private sector becoming much more involved, we see joint arrangements between land-grant universities and the private sector to conduct research, especially the biotechnology research. And we see that this research may, or may not, match what we consider to be national priorities. So you do have a "Russian Roulette" in terms of what goes on out in the research community, as to whether or not research does match up with national priorities anymore.

PRIORITY SETTING

The Senate and House both established two Boards that we've talked about here today to recommend priorities. The Joint Council, and the Users Advisory Board, and we've heard quite a bit about that already today.

Prior to the establishment of the Joint Council and UAB, much of the priority setting for agricultural research was done by administratively administered advisory committees that basically came up with laundry lists of research topics. Little, if any, real priority setting existed.

DEFINITION OF A PRIORITY

As you mentioned, and as I have in my statement, I thought it was important to include the definition of a priority, according to Webster, "is the quality or state of being prior; superiority in rank or position; or a preferential rating." And it's something I think as you've mentioned earlier we've gotten away from, and we use that term very loosely.

In work that we've done in the past, we've found that the Joint Council and the Users Advisory Board really struggled with being able to establish priorities. Our view today is that they are doing a much better job of that priority setting than when they were first established. But, as the previous panel already mentioned, there is a lot of maturing yet that needs to go on, and basically I would say at this point that there is little, if any mention made, particularly by the Joint Council, as to what the research community is willing to give up to attain new priorities.

PROVIDE SOLUTIONS TO THESE PROBLEMS

We talk an awful lot about what we need to be doing and the important areas that we need to direct resources, but we don't in the same breath then say, to do that, we're going to have to cut off programs in other areas. In the business world this is what goes on all the time. And I think we are very lax in the public sector for not being able to say we're going to give up some areas. These are areas in which we've done research, the research has resulted in these types of success, and it's time now to reallocate resources and move on to higher priority areas. That type of debate does not take place within the public sector.

I think as we work in the study that we're currently doing for the committees we're going to use some criteria, that which has been suggested by Congressman George Brown as a basis on which to make some decisions as to the appropriateness of how you should go about reauthorizing in your debate here, the Joint Council and Users Advisory Board. And I think these are important questions.

SUGGESTED CRITERIA ON WHICH TO BASE THE DECISION WHICH WE THINK SEEM APPROPRIATE

First, does the Joint Council and Users Advisory Board provide a unique function in determining research priorities? Are the priorities any different than what you get from other groups?

Second, does the Joint Council and UAB provide sufficient advance planning, given the lag time in research activities? Can we identify problem areas enough in advance that you can reallocate resources to get the job done?

Third, does the Joint Council have a sufficiently broad membership to integrate research needs and scientific advances coming from the nonagricultural disciplines? Things that were mentioned in the first panel.

Fourth, is the UAB membership representative of the users of agricultural research?

Fifth, and most important, what impact does the Joint Council and the UAB have on the priorities set by the Department of Agriculture in its budget, or the priorities set by the Office of Management and Budget, or on the priorities reflected in congressional appropriations?

MORE ACTORS THAN THE JC AND UAB

I think as Chuck has just mentioned, I think a follow-on as to what has happened with all the recommendations that have been made. And I think sitting on the committee you can't ignore the fact that there are many other actors out here that are establishing research priorities. And Congress is probably one of the biggest actors in this, because you all are beseeched daily by desires of your constituents, and this has resulted, for example, in agriculture research of commodity groups, or particular universities receiving higher priority for funding than some predetermined research policy thrust. The fact that most major commodity groups and many universities have Washington offices is certainly not accidental. Such offices have proven to be very effective for these groups and, as a result they can complicate the more formal research priority-setting process. It should be noted that there are a few major universities that have established a policy of not accepting research funds that are directly solicited from Congress.

ESTABLISHING RESEARCH, EXTENSION, AND TEACHING PRIORITIES IS MORE ESSENTIAL TODAY THAN EVER BEFORE

So as you look to the title XIV of the role that the Joint Council and the Users Advisory Committee make I think we need to realize that this is a very dynamic process, that research priority setting in this day and age is a very frustrating process, and that we do need to examine whether or not we currently have mechanisms in place that can really help us get on top of this situation and to try and look out to a more bold and clear vision of what will be the problems that need to be addressed in the future and the role that the research system can plan in terms of preparing us for the next century.

DEFENDING THE STATUS QUO WILL NOT DO THE JOB

I think defending the status quo, as we are want to do, is just not going to be satisfactory for us to be a competitive nation in the future. And with that I will stop at this point.

[The prepared statement of Mr. Phillips appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you, Dr. Phillips.

Mr. Harman.

STATEMENT OF JOHN W. HARMAN, DIRECTOR, FOOD AND AGRICULTURE ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, U.S. GENERAL ACCOUNTING OFFICE, WASHINGTON, DC

Mr. HARMAN. Thank you, Mr. Chairman and Senator Kerrey. I do appreciate the opportunity to be here this morning to present information on our earlier reports on agricultural research activities. Although we have not had the opportunity in recent years to review programwide aspects of such activities, we issued several reports in the 1980's dealing with various aspects of agricultural research. My prepared testimony discusses several of these previous reports, including the recommendations we made at that time and an update of the actions that have been taken on those recommendations.

As you requested, I will summarize the prepared testimony focusing primarily on one of those reports, which I believe has the most applicability to the subject of the hearing here this morning.

LONG-RANGE PLANNING

We reported in July 1981 that the U.S. agricultural research and development system did not perform adequate national long-range planning, including setting priorities. I think that is something that has been confirmed several times here this morning already. We said that increasing demands for food and fiber, combined with increasing pressures on agricultural inputs, made it essential that national long-range planning be undertaken for agricultural research and development. And certainly that environment has not changed. If anything, the issues currently facing agriculture make good planning more essential.

We pointed out that the key participants in the agricultural research system carried out long-range planning to only a very limited extent. No rationale for long-range planning had been developed; and past planning efforts had not resulted in national, systemwide long-range plans. We also pointed out that a number of factors inhibited such planning. Management and planning for individual research projects were split among Federal, State, local, and private authorities; and this fact, plus frequent changes in departmental leadership, a lack of continuing congressional interest, and limited executive interest and guidance, made long-range planning extremely difficult.

RECOMMENDATIONS

We recommended, as we had in a 1977 report, that the Secretary of Agriculture develop an agencywide long-range plan for agricultural research and development.

The Congress later in 1981 reemphasized the importance of long-range planning by, among other things, requiring the Secretary to take the initiative on overcoming barriers to long-range planning by, first, developing a long-term needs assessment for foods, fiber, and forest products and, secondly, determining the research requirements necessary to meet those needs.

Now, although we have not evaluated the effectiveness of the planning actions that have been taken since that report, the process does seem to have improved; again, something that seems to have been confirmed here this morning.

Following enactment of the amendments, USDA asked the Joint Council, which was created by the 1977 farm bill, to direct the preparation of a long-term needs assessment, and that needs assessment was published and sent to the Congress in January 1984. In addition, the Joint Council has become much more active since our earlier report, issuing several key planning documents. And finally, USDA has developed long-range plans as a basis for future research management. In 1983, for example, as the Assistant Secretary mentioned, it developed a plan consisting of a strategic plan, an implementation plan for the period 1984 to 1990, and operational plans supporting the strategic plan. In September 1985 USDA published its second implementation plan, which covered the period 1986 to 1992.

Now, we've not looked at those plans from the standpoint of whether the priority setting is adequate—whether the planning process indeed is achieving what it is intended to achieve. But what I am saying here this morning is that a process at least does exist now that did not exist when we looked at that planning process earlier.

PERSONNEL NEEDS

The other reports discussed in my prepared statement, all of which were issued in the early 1980's, dealt with such subjects as personnel needs, use of research facilities, and funding. Regarding personnel needs, we reported in 1981 that USDA could do a better job in carrying out its responsibilities as the Federal Government's lead agency for keeping abreast of personnel needs in the food and agricultural sciences. USDA's former Assistant Secretary for Science and Education earlier this year emphasized the broad need to strengthen the programs at the Nation's colleges of agriculture and natural sciences. In support of this need, USDA has made several proposals for improvements in this area.

FEDERAL AGRICULTURAL RESEARCH FACILITIES

In the January 1983 report, we said that despite the underuse of existing agricultural research labs, new laboratories were under construction and others were being planned. We questioned the wisdom of this approach and recommended that the Secretary develop a plan to consolidate agricultural research activities at fewer locations, something which seems almost as difficult to achieve as setting priorities. In developing its long-range plans, USDA has included laboratory needs as part of those plans, and has included suggested consolidations and closures.

FEDERAL AGRICULTURAL RESEARCH FUNDING

Finally, a 1983 report discussed some aspects of funding and provided some information, but we did not make any recommendations in that report. That concludes the summary of my statement, Mr. Chairman.

[The prepared statement of Mr. Harman appears at the conclusion of the hearing.]

Senator DASCHLE. Mr. Harman let me just start out with a question to the three of you, because it's another facet of this that I wanted to get into this morning, and that deals with this concept of consolidation of research. Critics have argued that there is too much overlap, and that is as Dr. Marshall said, we're putting research in the hands of those, especially in some very technical areas, that may not have the capacity to use it effectively. Number 1, given your experience would you favor research consolidation, and secondly, if you do, would you favor the approach Senator Leahy and others have at least advocated we consider. And that is develop a DoD like board to go after those locations which may not have a purpose any longer and take that research and consolidate it with those which do. Let's start with Mr. Harman since you mentioned it.

Mr. **Harman**. Well, we are currently doing some work for one of the House Agriculture subcommittees trying to get some more information, updated information, on consolidation of laboratories. Based on our earlier work, solely on that earlier work because we haven't reviewed this area since then, I would say, yes, we do favor consolidation of laboratories and research facilities in those cases where it looks like—and it looks to us like the situation may still exist, but where it looks like the labs are so small that they can't take advantage of some of the types of information that could be gained from the combined research labs and from scientists being able to interact with each other. And the situation that has existed is that more labs are being created while the personnel ceilings have stayed basically the same. So you do have a situation where, in our view, it looked like there was a need to consolidate some of these facilities.

Senator **Daschle**. This may be an unfair question, but if you were to do that, and wave a magic wand and somehow eliminate the facilities that in your opinion are unnecessary. Are we talking about 10 percent, 15 percent, 20 percent?

Mr. **Harman**. I wish I could answer that question. I think this has to be taken as part of your overall planning process. You cannot just say we don't need a facility here because it has only 10 people in it. It could be that those 10 people are working on something that is very "high priority," but——

Senator **Daschle**. That is all we need is another priority list of priority stations.

Mr. **Harman**. Well, I think you have to look forward, and that is why we were advocating a longer range planning process back in 1981. You can't look at 1 or 2 years and say here is where we're going to be. You have to say well water quality is going to be an issue, and we know it's going to be an issue for some time in the future. Now, where is our capability? Where does our capability exist to carry out that kind of research? And you're going to put the funds in there and carry that out, and that is true for food quality, food safety, and other issues. But I would tend to agree, looking at these lists, that it's not a problem that is unique to agriculture. I spent a good deal of my time in energy R&D, and energy faces many of the same problems in terms of what is a priority, because you also have constituencies there.

So it's a very difficult problem. I think what you have to do is develop the criteria that you're going to use on which to base your judgment of priorities.

Senator **Daschle**. Mr. Phillips.

Mr. **Phillips**. Well, I would basically agree with what Mr. Harman is saying, that there is quite a bit of consolidation that can be done, and to ARS's credit they have made attempts in the past to do that. And I think over the last 6, 7, 8 years or so, they've been able to make some inroads. I recall in the late 1970's there was something like 140-some type of laboratories under their control, and I think now it's down to somewhere around 120.

Senator **Daschle**. It's in the 120's now.

Mr. **Phillips**. So that is not a great consolidation, but at least it's some headway, and I think they would be the first to tell you they ran into a lot of stiff resistance to be able to do that. And I think as you mentioned a DoD type of approach to this might end up being the way to go. An authoritative body that says these are the ones that should be closed, and these are the reasons why. But, I think it is very important to make the point, many of these labs have sprung up and we've hung on to them for reasons that don't have much to do anymore with what are the kinds of problems are facing agriculture and the science and technology to address those problems. I think that gets to be the real nub of it.

It is part of a symptom of a problem where we're still out here, if you are in plant science, you are upset because there are more resources going to animal science and vice versa. Or if you are in the crop sciences you are more or less upset because not enough is going to plant science, too much is going to soil science. We have those kinds of debates that take place around the margin of this research priority setting, and you end up funding new labs because of constituent pressure. And this is something we have to finally get over, we have to finally get that behind us and look at what are the problems facing American agriculture for this next century, and what is going to be the science and technology to confront those problems. And that is something that I think is lacking, and there is probably a number of reasons for that, not the least of which is you have to go back and look at resources. As we said earlier to make decisions that there are some areas that just have to be cut out. And we haven't really been able to stand up and say that.

Senator **Daschle**. Dr. Benbrook.

Dr. **Benbrook**. Mr. Chairman, the need for consolidation, which I might add exists both in ARS and in the academic sector, is driven by two factors. One is that science and technology and the tools of the trade have evolved very rapidly requiring some very expensive equipment, and even more important, teams of researchers that posses among them some very specialized new skills. You have to continually be able to support improvements in human talent, facilities and equipment so that the best work possible is undertaken, and to advance science the most rapidly.

It is very difficult to sustain sufficient resources in many of the smaller, isolated research locations that ARS currently manages, and also in some of the universities around the country in departments that are not highly relevant to the major agricultural industries in the State. It can be very difficult to maintain a credible range science department in some of the eastern universities. It is not difficult to maintain a world class range science department in Wyoming.

Senator **Daschle**. Or South Dakota.

Dr. **Benbrook**. Or South Dakota, of course. The other point is that we need to consolidate and think about relocating the critical mass of agricultural research and technology development in this country because we have to do a better job in utilizing quickly the results of science in practical, management-based systems for farmers, for technologies for the food processing, and agribusiness industries, and in the development of better policies. And for that to happen we have to bring the generation of knowledge, and the people that carry out S&T activities closer to decisionmakers, leading farmers, farm organizations, commodity groups, and industries. If they're out in the countryside isolated, it is difficult to get partnerships, dialogs, and communications essential to the transfer of knowledge in place. As a result, it is hard to quickly move from the discovery stage of science through the application phase. It is not that work going on at any of these locations is no longer important or that the work of the individuals is somehow of a lower quality. That is rarely the case, but it is simply a matter of whether there may be a way to tap their talents and use that money to get more results.

Senator **DASCHLE**. Senator Kerrey.

Senator **KERREY**. Mr. Benbrook, let me ask you a question, and anyone of you can pick up on it. It seems to me that one of the things that is awfully difficult to plan around is that every now and then some human being gets it in their mind that they're going to do something and they just get it done. And they reorder the priorities all of a sudden. I have a good friend by the name of Woody Varner in Nebraska who decided he wanted to build a performing arts center in Lincoln, Nebraska, and all of a sudden performing arts moved to the top of the list. And we built a performing arts center. He raised the money privately, talked me into supporting it, and he just singlehandedly pushed the darn thing through. Very often the trouble with plans is that every now and then people get in their mind to do something different and they just do it.

The thing that I'm trying to wrestle with and the reason that I see priorities as being extremely important, particularly ones that are centered on the producer themselves and the problems that they are facing, is that I'm very much aware that technology has a tendency to go in a certain direction. It is often predisposed to head in one direction or the other. There is a terrific book by Neal Postman called "Amusing Ourselves to Death," a political discourse in an electronic age wherein he says that the light bulb would have been on the market a lot sooner, except Thomas Edison kept turning it on and holding it up to his ear and saying hello, hello.

Now, the light bulb was going to affect the world and move the world in a certain direction because of what it did to us. And priorities become very important because they guide us as to when we should say no in trying to shape what the policy for the Nation is going to be. And one of the things that I heard you say, that I think I have to personally guard against just because I tend to like things that are new and improved, is that you recommend that $500 million be targeted to new and exciting technologies.

And, I'm very confident that new and exciting is an insufficient criteria to judge whether or not we're going to invest money. I'm curious as to how you factor in the objective portion of technology investment. Where we are trying to go is awfully important. My job is to try to develop national objectives, and then establish some priorities that enable me to measure, particularly in relation to the farmer, if I'm moving in that direction. How do you determine all that?

Dr. **Benbrook**. Our studies, most of the studies that OTA, and GAO have done focus on Federal research programs, but we have to do so cognizant of the fact that we have a Federal-State partnership, and as Mike pointed out the Federal investment, or portion of that contribution, has declined somewhat as the States have become more responsive to the very pressing problems that producers in your various States face. They want a solution to the wheat aphid. I mean it is eating up the wheat and we have to do something about it. That kind of immediate problem at the national level is what we face with AIDS. Look at the response in Federal science funding within the National Institutes of Health, within the Congress of the United States to the problem of AIDS. When the Nation faced what was a clear and compelling challenge it gripped everyone, the Federal Government responded.

If you look at some of the problems that agriculture deals with, the nutritional attributes of the food supply, the safety of the food supply, dealing with foodborne illnesses, we are talking about public health problems, issues of the same magnitude as AIDS, perhaps not as dramatic, but which certainly affect just as many people. You look at the incidence of heart disease, and cancer, and other illnesses that are diet-related, that are all determined or influenced by the food supply, the enormity of the impact is just as great, but there has not been as clear a voice at the Federal level of government articulating the opportunities and challenges that science must meet if the Nation is going to move in a new direction.

So, I guess the problem, Senator Kerrey, is that no one has been speaking with sufficient force of vision in the area of Federal science priorities in food and agriculture. There has been a sort of maintenance mentality to keep the programs going, keep the agencies on a steady course, but there has not been, despite many reports and studies that have identified exciting new areas, there hasn't been much response.

Now, the definition of an exciting new area of science and technology is knowledge that makes it possible for agriculture to solve a problem that we either don't have the ability to solve today, or do so only after spending lots of money and time in lawyers, et cetera.

We have the capacity to present the consumer with essentially risk-free food. We're practically doing it now, and yet we're dealing with this as if it's a crisis of equal proportion to overconsumption of fat, which is ridiculous.

Senator **Kerrey**. I have to interrupt. Are you saying the consumer is wrong?

Dr. **Benbrook**. I'm saying that——

Senator **Kerrey**. Are you saying that I ought to go back to my farmers and say that the customer is not always right. If consumers become frightened, they're frightened.

Dr. **Benbrook**. It depends if you want to get reelected. I mean the consumers are rough, they have reason to be concerned. What they read troubles them, but what I'm saying is that the system has the capacity to deal with a lot of those problems in a way that does not feed into consumer concerns. And it's the inability to deal with these problems that I think continues to plague us.

Let me give you a tangible example. This was one of our first reports on pesticides and ground water quality, it came out in 1986. It offered a series of recommendations that would have led to a much improved data base for knowing where in American agriculture, and under what conditions a farmer is likely to contribute to the contamination of his or her ground water with pesticides and nitrates.

In the absence of any sense at the national level that we are getting a handle on that problem. One of your colleagues, Senator Fowler, has written a bill [S. 970, Farm Conservation and Water Protection Act of 1989]. It's a low-input sustainable agriculture bill that includes a provision that would require farmers to voluntarily test their wells, federally cost-shared, in order to find out if they have pesticides in their wells. And in the absence of the farmer voluntarily doing that they have to keep detailed records of all pesticide applications et cetera, et cetera, and make those records available. That provision in the Fowler bill is a response to a lack of information that was identified as important and missing years ago, not just by us but by others. It is this inability of the system to respond to important and legitimate concerns when they are first brought to bear, in a credible way that satisfies people, that remains a major problem.

We know enough about the presence of pesticide residues in food to do whatever we need to do about it. Whether it is regulation, or changes in commodity programs, or conservation provisions, the country lacks the sense that we have a handle on these problems.

Senator KERREY. Doesn't that have a lot to do with the way it is presented. Food safety comes from these spectacular reports on "60 Minutes" and on all these nightly news programs whereby a sensitivity is created that doesn't exist, for example, in fat consumption issues, because it is not presented in the same spectacular way. Is that not a part of it?

Dr. BENBROOK. The pesticide side of the food safety issue has been characterized by a perceived lack of progress in the environmental and public health community that really goes back to the late 1970's. You're aware, Senator, of all the effort to try to get FIFRA reform legislation through, which finally culminated at the end of the last Congress in the bill we've come to know as FIFRA Lite. Well, despite that legislation, the record of performance in dealing with a lot of the old pesticides that appear to pose risk above the negligible level—which is what EPA has identified as of concern—is at best spotty and is interpreted by environmental groups as evidence of great danger in the food supply.

Very few scientist believe that because the residues of a few dozen pesticides may occasionally be above the tolerance level that there is a grave and immediate threat to the food supply. Yet the public has this sense that if the Government says that this level is safe, that anything over it is unsafe.

It is the same thing with priorities in agricultural research. Many of us can agree, and many reports do agree on what the priorities are, but the response in the system is what is lacking. The same thing holds true in the regulatory area. We know where the potentially excessive risk are in the food supply, we haven't done anything about it. So the environmental groups turn that fact around and trumpet it on "60 Minutes" and in some cases that grabs attention and we have the makings of the pesticide of the month treadmill which we've been on now for a couple of years.

Senator **KERREY**. I hear in that, unfortunately, that you believe that if you could just educate these consumers everything would be all right. I remember hearing my cattlemen saying that all the way through the 1970's. I'm in the restaurant business, and we have a rule in my business that says no matter how good I think the food product is, if the customer thinks it is garbage, it by definition has become garbage. I hear in what you are saying that if the consumer gets frightened by a food product the answer is to go to the consumer and say quit being so scared. The fact of the matter is the world has changed.

Two generations ago we all prepared our own food. But I eat out of a bag today. Other people are not only growing my food, but processing and cooking it. So I am increasingly dependent upon somebody else to process it, and increasingly anxious about what they are doing in the course of doing that. I think it would be a mistake for me as a representative of an agricultural State to go back to my producers and say, "gee don't worry about the customer, I'll take care of the customer. I'll tell the customer that don't get so frightened." I think that would be a mistake, I should instead encourage my producers to be increasingly concerned about what that customer wants; increasingly concerned about what the consumer thinks. The closer they get to the consumer, the more apt they are to respond to consumer needs, and the more apt they are at responding to consumer needs, it seems to me the more they are going to be profitable and successful out there on the farm itself.

I get very concerned about this view that if we just educate the consumers a little bit everything will be OK. How do you think the consumers feel in Oakridge, Tennessee right now? They have heard the Department of Energy say don't worry about this plutonium enrichment factory out here, we're doing a great job. But they dump cesium and strontium into the water supply that's run through the community. The consumer has good reason to distrust the reports that come out and say don't worry about it, it's safe.

Dr. **BENBROOK**. I'm speechless.

Senator **KERREY**. Well, you don't have to be speechless, you can jump back in and say I'm wrong.

Dr. **BENBROOK**. But I think the point is that if they are sensitized as they should be to food safety, they ought to also be sensitized to education and other elements of food safety, in addition to pesticides which is what we're not doing. For some reason they aren't as concerned, for whatever reason, on fats and on cholesterol, although people are becoming so much more sensitive in recent years.

Senator **DASCHLE**. But I get a different sense from Mike and from you with regard to responsiveness. As I read through your report Mike, the sense I have is there has been response to OTA studies. You list the results of each one of these studies and if one reads the testimony it appears that that responsiveness has—I mean there isn't any editorial here that along the way that says they haven't responded adequately, it just says result. And in each OTA study there is a result. Would you agree with Dr. Benbrook that in many cases the result has not been satisfactory?

Dr. PHILLIPS. Well, I guess in many respects that is in the eye of the beholder as to how much change you want to see.

Senator DASCHLE. OTA has put the study together. Obviously they have some expectations with regard to what they would like to see as a result. I guess the question would be, are you satisfied that your expectations were met with the studies as they were presented each and every time?

Dr. PHILLIPS. Well, it's a matter of I guess, you see change take place. I think it is probably not all that uncommon to not see change. I mean there are enough pressure points, I mean it's not just the fact that there was an OTA study, but there were other studies, the Academy, or the GAO, or the system itself. And many times you see reports come out that tend to push the system in a direction, and so kicking and screaming at times you do see change take place. I think what I tried to point out in my testimony is that you'll see a range here.

Sometimes you'll see change take place fairly quickly, quite a rapid response. That means somebody was at a pressure point within the system. Others, such as the concern for environment, food safety, that has taken us awhile. You can go back to reports that we've done over the past 10 years that pointed out that there were these concerns. And we're only seeing now change take place with the LISA Program, and others, here late in the decade of the 1980's. There was research going on by what the system considered to be real splinter groups out here that didn't know what they were doing, and really were put down in many respects because of that type of research. They weren't considered a credible part of the science community.

Well, now I think enough credibility has been established for many of these groups that now there is something to be said that maybe there on to something. And now maybe we need to put some more resources to helping build up the science that we need to develop a track record to see if this is indeed a way in which can open some new roads to agriculture to develop new crops, or to do a better job of not using so much chemicals, and clearly in terms of biotechnology and the direction it goes.

Senator DASCHLE. Dr. Benbrook, do you share that view?

Dr. BENBROOK. Well, I certainly agree with Mike that some of the environmental and food safety concerns have been responded to perhaps somewhat more slowly than more traditional production oriented concerns. Another important point I think is that many of the principal recommendations in an OTA report are directed to the Congress, and I think Congress has been, and continues to be, fairly responsive institutionally to recommendations that come from GAO and OTA. I think that, in concert with the congressional interest in seeing executive branch action on OTA recommendations, there has been an additional pressure point in the institutional process for OTA reports that have proven very helpful. I think that bodes well for the ongoing work that OTA is doing. I think OTA reports have had, in general, more impact than those of any other institution outside of the system. I hope that that continues, because their reports have generally been very insightful and constructive.

Senator **Daschle**. Let me just see if I can summarize real briefly from what I've heard, at least the first two panels and see if you share this few or not.

One, we do lack adequate prioritization.

Two, there may be a need as we look at the way we approach research to look at the facilities themselves for the kind of overlap, and duplication, and lack of focus that might otherwise be created if we were to put greater focus on research.

And, three, there does seem to be some difference of opinion with regard to responsiveness.

Dr. Marshall left me with the clear impression that we aren't as responsive as we ought to be to changing needs. You seem to be a little less severe in your criticism of the research community with regard to responsiveness than Dr. Marshall was. Is that a fair assessment of position?

Dr. **Benbrook**. I would simply like to add that I believe that the major problem is a discontinuity between the process we use to set and agree upon priorities, and the processes we use to direct money behind those priorities. And, I would urge you to look at the structural aspects and the funding mechanisms that are used both within the executive and legislative branches to try to come up with some ways to bring about greater harmony in both the congressional and executive branch views of priorities. Incidently, our institution did a report on science and technology budget setting that has some suggestions that may be useful.

Senator **Daschle**. Dr. Phillips.

Dr. **Phillips**. Well, I agree with what your saying. I just want to make one other point to that. Yes we have done a pretty decent job of seeing some change take place, but I think we have a ways to go and I don't want to say that I'm sitting here saying that we are satisfied. I think we are seeing something take place in the biotechnology arena that is a good example of how we can do a better job. We have technologies that are going to basically be coming on the market in the early part of the 1990's, that if you look back and said, if we were to have done some prioritization and planning, is this the way in which we would like to have seen technologies come onstream.

And, I'm particularly thinking in the animal area of the bovine somatotropin, as well as the porcine somatotropin. And how in many respects these are going to have many different impacts on the industry, as well as the way society views the use of these technologies. We have, essentially, a technology coming onstream in a part of our agriculture industry in which we already have surplus conditions. And the question is do we really need to be making a bad situation worse, and it's going to give you in the Congress as you look at the farm bill, you're going to have some real tough decisions to make, because you're going to have a real impact on the dairy title when you're looking at something akin to a 20 percent increase in production. As opposed to the porcine somatotropin which is basically as close to a win, win situation as you can have in a technology development in terms of getting consumers something that they really desire.

So you sort of look back and say, if we had tried to plan this in any sense, maybe we could have looked at the way in which we allocate resources and made some difference in terms of priorities of which one of these would come on the market first. Because, I think what you're going to see in the bovine somatotropin is one in which we're going to have a hard hurdle to get over in terms of future advancements that we want to make in the biotechnology arena. Like it or not, I think that is going to be reality.

There is a lot of myth out there about what bovine somatotropin is going to do, and I think as Chuck said, we have to do a better job in terms of educating consumers about that. But, still it's going to be a perception that is going to be out there that the science community is going to have to overcome. And, so, that is just an example of how I use to say we can still do a better job, in terms of how we plan research and what we consider a high priority, and the way in which we allocate resources.

Mr. **Harman**. I would agree, Senator, with what you said. The one area that is somewhat intriguing is the point you made on responsiveness, and I have listened to the people here that have commented on that. I think part of the problem is we have an agricultural system here and it does not deal just with research, it deals with a lot of other changes we try to make in agriculture, which has been around for some time. It's built up quite a lot of special interests in different areas, and you don't change a system like that overnight, and in research, you don't make changes in research overnight.

I think a first step is the one that we advocated in the late 1970's and early 1980's when we started talking about planning, and then once you start talking about planning, you get into these questions: what's a priority and what do we mean by priority? And to me a key step that Congress could make and the administration could make is to define the criteria they're going to use. And Dr. Marshall in his testimony—the five things you talked about earlier there and referred to them as priorities—I would almost look at those as criteria. And then you have to look at to what extent do the kinds of research that we want to do, looking at the problems down the road, meet those kind of criteria, if those are the criteria you decide upon. It has to be flexible, and I think you have to have a system that allows for "new and exciting things" to be done. I like new and exciting things; that is why I buy a car and end up in debt, because of new and exciting things.

So we have to be careful about those new and exciting things, and you have to have some idea about where they're going to take you. But you have to have some way to be able to work those into your research system.

Senator **Daschle**. Well, my hope is that we're going to have as good an appraisal of the need to write into law some criteria by this fall, because it's certainly the intent of the committee to begin taking up the research title of the farm bill this fall, and I hope we're prepared for it. In that regard you've all presented us with some good comment this morning, some good testimony. Thank you very much.

Our final panel includes Dr. Alice Pell, assistant professor of the Department of Animal Sciences, University of Vermont, and Chip Morgan, with the Delta Council of Stoneville, Mississippi. If you two could come forward.

Dr. Pell, thank you for coming. Mr. Morgan we're appreciative of your presence here this morning.

Senator Leahy has asked if he could ask some questions of Dr. Pell, prior to the time that she leaves, and I'm going to ask a unanimous consent that after your testimony has been complete, and after Senator Kerrey and I have completed our questions that you stay if you will, long enough for Senator Leahy to be able to ask questions of you as well when he arrives. He should arrive within the half hour. But, let's proceed with your testimony.

The entire prepared statement will be submitted for the record, and you're welcome to comment as you see fit.

STATEMENT OF ALICE N. PELL, ASSISTANT PROFESSOR, DEPARTMENT OF ANIMAL SCIENCES, UNIVERSITY OF VERMONT, BURLINGTON, VT

Dr. **Pell**. Thank you.

BACKGROUND

Mr. Chairman, members of the committee, I appreciate the opportunity to discuss funding for agricultural research. As an assistant professor whose appointment is 75 percent research it has a very direct impact on my life. I'm in the animal sciences and one of the areas that I have a great concern right now is not only the amount of money available for agriculture research, but also the balance between the funds available from governmental and industrial sources.

I AM DOING RESEARCH IN TWO VERY DIFFERENT AREAS

A little bit of background may be necessary. I'm currently doing research in two very different areas. In one project, in collaboration with somebody from the medical school, who is a molecular geneticist, we're looking at the surface structures on cellulose-digesting bacteria to increase understanding of the process by which fiber is broken down. Although we are currently working with bacteria from the cow's rumen, this is an area which has applications in both human and animal nutrition, development of alternative sources of energy, and solid waste disposal. This project has been supported by Hatch funding and a grant from the EPSCoR program of the National Science Foundation. The second project which I have been working on is funded by industry and involves research to investigate the effects of bovine somatotropin, or bovine growth hormone, on the health and productivity of lactating dairy cows.

THE FUNDING SCENE IN AGRICULTURE RESEARCH IS CHANGING DRAMATICALLY

It's very clear that the funding scene in agriculture research is changing dramatically. When I was a graduate student, most agricultural researchers relied on Hatch formula funding for a significant portion of their financial support. Last year, I received about $2,000 in operating money. This paid the maintenance contracts on our centrifuge and computer, and our chemicals and radioactivity disposal costs. It's clear that we are going to have to look elsewhere to obtain funding. Possibly more serious is the status of equipment. Funds for equipment replacement have not been available. Last week was not a good week in our lab, our 22-year-old incubator died. Also, we're in a building which hasn't been renovated since it's construction in the 1940's. Electrical surges are an ongoing problem. Because we are working with bacteria, which die in the presence of oxygen, we are dependent on using an environmental chamber. Again, ours is an "hand-me-down" environmental chamber which leaks badly, and our progress has been impeded by the amount of time we've had to spend repairing leaks in the system.

THE DAYS OF RELYING ON FORMULA FUNDING ARE OVER AND THAT PROCURING GRANTS IS A MAJOR RESPONSIBILITY FOR ANY SCIENTIST DOING AGRICULTURAL RESEARCH TODAY

As I said earlier, the problems with depending on Hatch funding are clear, and last year I wrote seven major grant proposals to both private foundations, the Federal Government, and industry. I may well have spent more time actually seeking funds than doing science. One possible help to the researcher in this whole system is to try to coordinate different scientific funding agencies which would minimize the amount of time we have to devote to grant preparation.

When I was seeking funds for the cellulose degradation project I received comments from reviewers indicating that my most likely source of funding was the USDA competitive grants program. My problem is that for each of the last several years only one project in rumen microbiology and cellulose degradation has been funded by the Animal Growth and Development section of the USDA competitive grants program. It is unlikely that I will succeed in obtaining funds from the USDA when I am in competition with people who have 10 to 15 years more experience than I do. The USDA has no young investigator programs similar to those supported by the National Institutes of Health or the National Science Foundation.

Only about 10 percent of the new submissions to the USDA competitive grants program are funded. The total amount of money earmarked for agricultural research is small in comparison to that allocated to the National Institutes of Health, the National Science Foundation, or the Department of Energy, and the prospects for increases in this area seem small.

TWO POSSIBLE OPTIONS

To keep my research program going, two of the possible options are:

One, shifting my research into the biomedical area where funding is more readily available.

Two, obtaining industrial funding with the hope that I can save enough money to keep the cellulose degradation project going.

WORKING ON AGRICULTURE AND FOOD PRODUCTION PROBLEMS

The idea of switching into biomedical research is somewhat tempting, but I am always somewhat sad when I contemplate it. I chose the field of animal science because I was interested in working on problems related to food and agriculture production. I persevere in the belief that, in a world where the population is likely to double in the next 20 years and where serious problems must be addressed to ensure that adequate amounts of food are produced without causing irreparable damage to the environment, it should be possible to obtain adequate funding for agricultural research.

KEEPING A RESEARCH PROGRAM AFLOAT WITH INDUSTRIAL FUNDING HAS SEVERAL DISADVANTAGES

However, my other alternative, keeping a research program afloat with industrial funding, also has several disadvantages:

First, priorities are set by the needs of the industry commissioning the research, not by the researcher, or by a thoughtful examination of what information is needed.

Two, in most cases, the industrial funding available is for applied research. Although needed information about the safety or efficacy of a product may be obtained, our understanding of the basic mechanisms involved is not increased.

Three, in line with this reasoning some of this product evaluation research presents problems for young faculty because it is not viewed upon with favor by tenure and promotion review committees. However, industrial funding is the type of funding that is most likely to be obtained by young researchers.

Four, the direction of research is often determined by the availability of funding rather than on whether a significant scientific contribution is possible. And I am not trying to argue here that researchers should be allowed to address irrelevant questions indefinitely, but my area of expertise is cellulose degradation, and when I stray very far from it I question whether I'm doing a wise thing.

Five, in part due to the very tight funding situation, we as scientists tend to be quite conservative in our choice of research topics, opting to choose an area where we know we can make progress, but that progress may be rather trivial. In contrast to taking on a more difficult task where our progress may be slower.

Six, a problem with strong reliance on industrial funding is that projects which may be of great benefit to either farmers or consumers are not undertaken because funding is unavailable.

QUESTION OF DISTRIBUTION OF THE RELATIVELY SMALL AMOUNT OF FEDERAL MONEY

The question which you as members of this committee are clearly wrestling with is how to distribute the relatively small amount of Federal money likely to be available for agriculture research to alleviate these problems. From my perspective, some Hatch funding or formula funding needs to be retained to be used to restore and maintain the agricultural research infrastructure. The previous speakers made comments about needs for consolidation. I would try to suggest that perhaps looking at the quality of the science done at an institution may be more important than numbers.

I will use the University of Vermont medical school as an example. It is 76th in size in medical schools in the country, however, we are fourth in grant dollars per researcher. And if that is an index of good research you can be mean, and lean, and small, and still be productive.

YOUNG INVESTIGATOR PROGRAM

I think that from the perspective of a young researcher it would be extremely helpful to have a young investigator program. I support the resources which have gone into the competitive grants program, I think that that is a better alternative than sole reliance on the old funding mechanisms. There are some questions which I think need to be addressed in ensuring that some institutions don't get insuperable advantages over researchers in other institutions. Thank you.

[The prepared statement of Dr. Pell and responses to written questions posed by Senator Leahy appear at the conclusion of the hearing.]

STATEMENT OF CHIP MORGAN, EXECUTIVE VICE PRESIDENT, DELTA COUNCIL, STONEVILLE, MS

Mr. MORGAN. Thank you, Mr. Chairman. I'd like to submit a statement for the record and just highlight some of the excerpts from the statement.

Senator DASCHLE. The entire text will be in the record.

Mr. MORGAN. Mr. Hand was supposed to give this testimony on behalf of Delta Council, which is a producer organization from northwest Mississippi. But, unfortunately, and ironically while the Congress considers a drought bill we have 230,000 acres of cropland underwater in Mississippi right now flooded, and representing about a 30 percent loss. So he is at home on his farm and trying to get some drainage to get the water off his crop to see how much damage, and access damages.

DELTA COUNCIL A PRODUCER ORGANIZATION

Mr. Chairman, we are a producer organization representing a small area in northwest Mississippi that produces about 70 percent of the agriculture production in our State, primarily cotton, soybeans, and rice, and we produce almost all of the wheat, and all of the farm raised catfish that are produced in the State of Mississippi in our area.

RESEARCH TITLE

We express our appreciation to Senator Daschle and this committee for beginning early in pursuit of input for the research title of the 1990 farm bill, and hopefully revitalizing a higher priority, as I have heard most of the testimony this morning, in terms of agricultural research that will make us more competitive in the global markets.

WHY ARE WE COMPETITIVE?

We have noticed in recent years that many skeptics or critics have contended that American agriculture is competitive only because we have better land and water resources in the United States. And I think a short study of this will tell you that the country of India, and parts of Africa have equivalent land and water resources. So it is not really founded to say that the United States has a superior land and water resource base. These countries, India and parts of Africa, that have equivalent land and water resources, cannot self-sustain themselves in the food and fiber system. We would like to think that our farmers are smarter, possibly more intelligent in some instances, and we hope they are, but a careful study of that will even show that our average farmer is producing more food and fiber per acre in most instances in our major commodities than his counterpart in similar developed countries overseas.

PUBLIC SUPPORTED TECHNOLOGY MAKES A DIFFERENCE

So what we say from our producer organization is that really the undeniable ingredient that has accounted for a major part of the difference between the efficiency of American agriculture, or the productive capability is public supported technology. And that technology transferred to the farm through a system that is the envy, in our judgment, of every other development and underdevelopment nation in this world.

ARS AND THE LAND-GRANT SYSTEM

ARS and the land-grant system, even though I've heard a lot of testimony this morning about many structural problems, and many priority issues, I'm not qualified, Chip Morgan as an executive officer of a producer organization, to debate that issue. But, I think it is undebatable that the system has brought us to the most efficient industry known to the world. It provides trade balance, it provides a stable, reliable, inexpensive source of food and fiber for this country, and it also provides additional economic productivity, not just the blending and stirring of economic activity that we find in many of the service industries.

INDEPENDENT STUDY

One of the things that I'd like to show you that we did for our congressional delegation from Mississippi was just, we asked for an independent study to be done by Virginia Tech University on just the efficiency of productivity of agriculture research in our State alone on the four major crops. And for every dollar that was invested, and that is Federal, State, and local dollars invested in agricultural research in our State alone, we validated and documented $41 in benefits according to this independent study done by Virginia Tech (chart 1). This is a large part of the reason that we have been able to sustain State and local support on many of our budgets on agriculture research.

RURAL REVITALIZATION

We also have looked at the rural revitalization, Mr. Chairman, that we've received so much attention, in research budgets, extension budgets, and others. And one of the things that we would like to add about rural revitalization, is that we think that agricultural research, production research has a role in revitalizing rural America. And to demonstrate this we took some very conservative, and what are viewed by the scientific community in our State as attainable goals in increased production on four major crops in our small area in one State. And, by reaching these attainable short term goals, we add approximately $161 million of economic productivity and that is direct that does not include any of the indirect services (chart 2). And we make a pitch that this is pretty good revitalization in an 18 county region to infuse a $161 million through added productivity on the same acreage.

MESSAGE DELTA COUNCIL WOULD LIKE TO SEND TO THIS COMMITTEE

The message in conclusion really that Delta Council would like to send to this committee, and to the Congress, is that we appreciate the Federal commitment that you've made to agricultural research, and although in recent years Congress has been required to restore funding after the executive budget has identified research initiatives that apparently they felt were no longer needed. Even with the strong advocacy of the authorization and appropriations committees on behalf of agricultural research, there has been a significant erosion of resources allocated to agricultural research, as you can see by this chart of the R&D budget for USDA (chart 3).

Dr. Pell mentioned NIH, NSF were just two that we selected, and while we have heard quite a bit of criticism about the performance of USDA, ARS, and the land grants this morning in terms of really structural issues and priorities, I would like to present the case to you Mr. Chairman and other members, that we've had extraordinary accomplishments that are recorded on every farm in our State, and I'm sure many other States, Nebraska, South Dakota, and other States, California, as a result of the system we have today. And this performance is measured by ability to outpace the cost of production. And since the passage of the 1985 farm bill, most of the commodities have done this.

And, while I fully support and our organization fully supports what we've heard this morning in terms of renewing a commitment, expanding support for agricultural research, possibly studying priorities, and this is something that needs to be an ongoing proposition in our judgment. We just hope that this committee will make certain that we do not abandon, or depart from a course that has also brought enormous benefits as a public. The friends in Congress has utilized virtually every method they have available to fall within the budget constraints and still meet all of the needs in agricultural research. And while this committee has recognized the high risk and long term nature of research, many in Congress may not understand that. And so we applaud you for sustaining this effort, and maintaining a focus on the long-term high-risk nature of research, and see that it has produced positive results for the public as well as the foreigner. Thank you, Mr. Chairman.

[The prepared statement and charts 1-3 of Mr. Ralph T. Hand, Jr., appear at the conclusion of the hearing.]

Senator **Daschle**. Thank you, Mr. Morgan. The bottom line is that it ain't broke, is that what you're saying?

Mr. **Morgan**. That is what the date on it reflects Mr. Chairman.

Senator DASCHLE. Dr. Pell, is it broke?

Dr. PELL. I'm not sure broke is the word I would use, it certainly is frustrating at times.

Senator DASCHLE. Well, you've described the frustration in your testimony. Let me ask you this, I would be interested in your perspective because you are at the local level, on some testimony provided to us the last time we had a hearing. A couple of the witnesses said, "the problem we have is that the tail is wagging the dog." We're not deciding the direction we ought to take research. The constituencies are deciding for us. And power is described by how many dollars you have. The more dollars you have the more power you have in making decisions, and oftentimes it's the Federal dollars that follow a smaller amount of private dollars in determining priorities in research. Do you share that perception, or is that an inaccurate one?

Dr. PELL. I'm afraid that I'd probably have to share it. The amount of money available from industrial sources in an applied discipline like animal sciences, which is also a discipline in transition, is not going toward some of the more modern techniques that were described earlier. And I'm probably one of those people moving in that direction. But, the industrial money is where money is available in the largest amount.

Senator DASCHLE. Of course, there is an implication that that is wrong, maybe it isn't wrong. Is it in your view?

Dr. PELL. I don't know, I think that there obviously is a need to have cooperation between industry and research. I have no question about that. What happens I think very often is we end up being funded by large corporations that aren't dealing with the farm constituency at all, and there may be some conflicts there. Is the research which is actually going to have a long- or a short-term impact on the farm happening right now? Some types of applied research are very difficult to get funding for—animal nutrition research is extremely difficult to get funding for. It's easier in the more basic disciplines, and very often through NSF or NIH. I mean I can turn my cellulose degradation into an NIH project, and that is probably my most likely source of funding. It is harder for me then to do the next translation which is to develop that idea sufficiently, so that there are farm applications for it. And that translation step is a concern that I have.

The other is that in working—well I think somatotropin may be an example. I've done work for Eastman-Kodak. Some of those products did come to market, some are being investigated right now. That may or may not be a benefit to the local industry, and our historic mandate anyhow has been to support agriculture which has been defined as farmers.

Senator DASCHLE. Mr. Morgan, do you have any thought with regard to the local level, given your experience in that of facilities in your area? Do you find oftentimes that it is the private sector that is driving the public sector with regard to priorities?

Mr. MORGAN. Mr. Chairman, we find that producers and the people that live in those rural areas have a far more vast influence on the direction of the research that is done in the high region, the Midsouth than private industry. In fact, private industry is significantly influenced in their experimental work, in their research work, by farmers in our region rather than private industry influencing the directions of public supported research. It works in the converse.

Senator **Daschle**. Just in terms of going back, pervasive question of priorities this morning, what sense do you have with regard to direction we are taking now in the balance between production and consumption? Obviously biotech and a lot of the different elements of research that will allow us to continually enhance and improve the quality as well as the quantity of our production will have priority, but do you see the food safety issues, and the alternative agricultural market opportunities that may exist through alternative forms of research to be something that we ought to put greater emphasis on?

Mr. **Morgan**. Well, Mr. Chairman, food safety, and water quality, and human nutrition, and biotechnology are terms that really the Congress play a large role in identifying as high priorities. And while there was a lot of study in rooms of administrators and scientists to suggest that these should become priorities, these have become priorities and our concern is that they maintain a sharp focus on these types of issues, but not at the expense, and never compromising the need for that farmer to have the opportunity to obtain the necessary technological data that he can head off many of those problems both in safety, in quantity, quality, and we have felt for a number of years, at least during the last 10 years that the Congress has shifted this emphasis. And they've shifted it for a very good reason, because constituencies reported to them that these were priorities. And they weren't always constituencies with the land grants, or national program staff of ARS.

There was usually a real good reason back in South Dakota, or Nebraska, or Mississippi, or somewhere that these became priorities. And we feel that is fundamentally a real strong way to determine priorities.

Senator **Daschle**. Dr. Pell.

Dr. **Pell**. I was a reviewer for the LISA project earlier this year, and am somewhat familiar with that. And one of my concerns is why we need a separate low income sustainable, or low-input sustainable agriculture program. It would be very nice to mainstream that into all of the production related projects that we're looking at. Is this going to develop a system that can be sustained in the long run? If we're looking at very basic research we may not know the answer to that as we undertake the research, but as we get into more applied areas, it seems to me that that should be a criterion that is applied to all research. And that we don't necessarily need to have alternative, but it should be integrated.

Senator **Daschle**. Very well. Senator Leahy has just informed me that he is not going to be able to make it. He was called away to another unscheduled meeting, but he would ask that some questions submitted for the record and responses be provided by Dr. Pell.

So with that I want to thank both of our witnesses for coming. I really appreciate it. It has been a very informative session this morning, the hearing is adjourned.

[See pp. 206 to 208 for the questions and responses submitted by Senator Leahy to Dr. Alice N. Pell.]

[Whereupon, at 11:55 a.m., the subcommittee recessed, to reconvene at 10 a.m., Thursday, July 27, 1989, in room SR-332, Russell Senate Office Building.]

[Material submitted for inclusion in the record follows:]

APPENDIX

PREPARED STATEMENT OF CHARLES E. HESS, ASSISTANT SECRETARY FOR SCIENCE AND EDUCATION, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC

Mr. Chairman, I appreciate the opportunity to appear before you and the members this morning to discuss the administration's views on current priorities in today's agricultural research programs, and to talk about the establishment of priorities in agricultural research.

While I have served as the Assistant Secretary for Science and Education at the U.S. Department of Agriculture for only the past few weeks, I have been privileged to serve as the cochairman of the Joint Council on Food and Agricultural Sciences for the past 2 years. One of the major functions of the Joint Council, mandated by the Congress, is to assist in bringing about more effective research, extension and teaching in the food and agricultural sciences in the United States by improving planning and coordination of publicly and privately supported food and agricultural science activities and by relating Federal budget development and program management to these processes.

Agriculture is the Nation's largest business enterprise. And, as with any large business enterprise these days, we find ourselves increasingly competing in the global marketplace. And, as with other industries, we must address the growing concerns over potential damage to the environment as a result of the activities of our industry. As we go about the job of establishing research priorities, we are confronted with two situations: The need to address immediate, short-term problems and conditions, and the need to focus on long-term issues.

You asked about the current priorities in research. Before moving into a discussion of the Joint Council system, I would like to touch upon the systems used by the Agricultural Research Service, and the land-grant institutions.

In 1983, ARS developed a 6-year program plan which strategically outlines priority research directions within the limitations of existing resources. The plan was structured to be flexible to meet changing national and world conditions. These plans are based upon inputs from the Congress, the administration, cooperators, sister agencies of the Department and private sector user and clientele groups. Broad priorities identified for the foreseeable future are environmental quality, food quality and safety, market competitiveness, agricultural profitability, and plant and animal germplasm. This strategic planning effort has established leadership for the Department in research planning and components of the agricultural system.

The Experiment Station Committee on Organization and Policy, through its subcommittee on Research Planning and Budgets, operates the State planning system on behalf of the State agricultural experiment stations. All stations participate through the activities of their regional associations of SAES directors. Also involved are the schools of home economics, forestry, veterinary medicine, and 1890 colleges.

When topics have been established and agreed to, directors prioritize the topics in rank order, the results being amalgamated on both the regional and national basis. National research results are passed on to the National Agricultural Research Committee, a subcommittee of the Joint Council, for consideration by the entire Federal-State research system.

The fiscal year 1990 budget submission of the Department reflects the use of the priority-setting system. For instance, Americans are becoming increasingly concerned about the quality and safety of the water supply. Our highest research priority is to address this issue. We have proposed increasing the budget for water quality work by $41 million, from $139.9 million to $181.1 million. Of the proposed increase, $13.9 million is provided for a coordinated research program to be conducted at Federal laboratories by the ARS and at universities through the Cooperative

State Research Service. The expanded program will build on the base of ongoing research in nitrogen and pesticide degradation in soils, sediment research, development of predictive models and work on biological controls and integrated pest management.

Biotechnology increasingly offers new opportunities to find solutions to difficult problems in agricultural research, in both plant and animal sciences. We consider it a priority to extend the use of biotechnology. For instance, we hope to gain a more complete understanding of location of important genes and gene sequences on chromosomes which will be a necessary precursor to full utilization of crop genetic resources. We are proposing to develop genetic maps of plants. Armed with this information, researchers will be able to provide farmers with plants offering resistance to diseases, drought, and other environmental stress factors. I might note at this point that we have proposed an increase of more than $4 million in the competitive grants program of the Cooperative State Research Service for plant science research, and an increase of $8 million for animal science research.

Another current priority is in the area of food safety research. We have proposed increasing food safety research by $5 million to reduce bacterial and pesticide residues in meat and dairy products, and research to develop improved animal disease diagnostic methods. ARS scientists will pursue the development of rapid screening methods to identify pesticide and drug residues in commodities and animals presented for slaughter and test methods for use by regulatory agencies to identify and confirm pesticide and drug residues in processed animal products.

Over the past several years, Joint Council has expressed concern over the growing shortage of agricultural scientists and recommended that this issue be given priority attention. In particular, the need for increased participation of minorities in the agricultural sciences has been recognized within USDA and the States. A Task Force of USDA officials and 1890 university presidents made a series of recommendations to strengthen the ability of the 1890's to provide quality graduates in the agricultural and natural resources sciences.

As a result, the Department's budget for FY 1990 contains a request for $11 million to be used for capacity building grants at the 1890 land-grant institutions and Tuskegee University to encourage recruitment, curriculum and research program improvements. Grants will be awarded through a competitive process and will require a non-Federal match. In addition, a new $2 million program is being proposed for a program of competitive challenge grants which will be initiated to foster improvements in agricultural science programs. And, the Department is offering a $3 million fellowship program which will allow 75 Masters and Doctoral students in the food and agricultural sciences to be supported for 2- and 3-year terms respectively.

Mr. Chairman, I cite the budget request as evidence that the priority-setting mechanism, properly implemented, does indeed get results. While the budget reflects other priority items, I will go into these a bit later in my statement.

You wanted to hear about the criteria and mechanisms that are used in establishing research priorities, and the degree to which these research results are used.

First, let me establish that the Department relies on the Joint Council to function as a major source for development of research priorities. It functions in this capacity in cooperation with the National Agricultural Research and Extension Users Advisory Board, university research organizations, commodity groups, the private sector organizations such as the Agricultural Research Institute, and others in the agricultural research and extension field.

The Joint Council was created by Congress in 1977, and is currently comprised of 25 voting members who represent land-grant colleges and universities, organizations or agencies involved in programs of research, extension or teaching in the food and agricultural sciences. Members are appointed by the Secretary. To ensure that regional differences are properly considered, at least one-half of the members are appointed from among distinguished persons from the land-grant schools. The Council has several ex-officio members representing non-land-grant schools, the State Agricultural Experiment Stations, the Users Advisory Board, development foundations, the Extension system, and other agricultural agencies and organizations. The Council is cochaired by the Assistant Secretary for Science and Education and a non-Federal member elected by the Council. Thus, I move from being the non-Federal cochairman to serving as the Federal cochairman.

There are three principal publications of the Joint Council, a 5-year plan is published biennially, and denotes the issues and challenges and associated goals and objectives of the food and agricultural science and education system.

An annual priorities report outlines the current national emphases of research, extension and higher education, and an annual accomplishments report summarizes significant accomplishments of the food and agricultural science and education system. I would note that copies of these publications are distributed to the Congress.

It might be helpful to take a quick look at these documents, beginning with the current 5-year plan which was published in May 1988. This publication identifies seven critical areas:

—Restoring a competitive and profitable agriculture.
—Revitalizing rural America.
—Maintaining water quality.
—Enhancing the future through biotechnology.
—Advancing knowledge and scientific expertise in agriculture.
—Understanding food, diet, and health relationships.
—Managing germplasm and maintaining genetic diversity.

In selecting these issues, the Council weighed several factors, including the potential impact on the profitability of agriculture, national needs, relevancy to the needs of the system in the future, and impact upon the general population. As an example, the maintenance and improvement of water quality is important not only to agriculture, but to virtually all Americans.

It is interesting to note that some of these issues have been carried over into the annual priorities report for fiscal year 1991 which lists 5 major goals and 12 priorities. The major goals are:

—Maintaining a safe, wholesome, nutritious food supply.
—Ensuring a profitable, sustainable food and agricultural sector.
—Conserving and protecting natural resources and the environment.
—Enhancing global competitiveness in agriculture.
—Enhancing regional economic opportunities.

The 12 priorities for FY 1991 are:

1. Improve water quality and quantity.
2. Expand biotechnology and its applications.
3. Develop agricultural production systems compatible with the environment.
4. Nurture the Nation's talent base in the food and agricultural sciences.
5. Improve understanding of diet, human nutrition, and health relationships.
6. Enhance competitiveness of agriculture.
7. Genetically improve economically important plants.
8. Improve safety and quality of food products.
9. Investigate potential effects of global climate changes on agricultural and forestry production.
10. Enhance control of agricultural and forestry pests and diseases.
11. Develop new and expanded uses for agricultural and forestry products.
12. Enhance rural economic development.

Mr. Chairman, I am citing the FY 1991 report which is now in the process of being printed. I will provide an executive summary of this document to you for the record.[1]

The Department is currently reviewing these priority recommendations with regard to preparation of the FY 91 budget request. The Secretary and his chief staff officers have been briefed on this report. Thus, the process of receiving, reviewing, and establishing priorities is followed by implementation. In my opinion, that is as it should be. As Assistant Secretary for Science and Education, I intend to continue this system. It not only works, but it works well.

Mr. Chairman, perhaps I should point out that our system is also capable of responding to rapidly emerging situations. A sudden and unexpected problem may need to be addressed on an immediate basis. In such an instance, we can divert our attention to the critical area of concern without a total disruption of the research system.

The priority-setting system, like priorities, must be able to adapt to change. In this regard, the Joint Council last fall published a document entitled "Continuing the Momentum" [2] which addresses the history, growth, and future challenges facing both the agricultural science and education community and the Joint Council. I am submitting a copy of this document for the record as I believe it will help the subcommittee understand our priority-setting system a little better.

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[1] The report of the Planning and Budget Subcommittee of the Experiment Station Committee on Organization and Policy, "Research Agenda for the 1990s—A Strategic Plan for the State Agricultural Experiment Stations," February 1990 ESCOP 90-1, is retained in the subcommittee file.

[2] See pages 161 to 177 for this document.

You asked about the degree to which the establishment of priorities can produce research results that are useful to the U.S. farming community. I mentioned that the Joint Council issues an annual accomplishments report. This report reflects well the direct relationship of the research and education community to the farming community.

I would like to cite just two examples from the current accomplishments in the current report relating to biotechnology, the first being a report on the accomplishments made in the field of biotechnology. The report notes that research conducted on biological stress is leading the way for genetically modifying corn plants with genes that improve crop protection and lower costs of production. Also noted in this section is a report on use of recombinant DNA technology to combat crop plants against viruses which could have an immense positive effect on agricultural production in the United States within this decade.

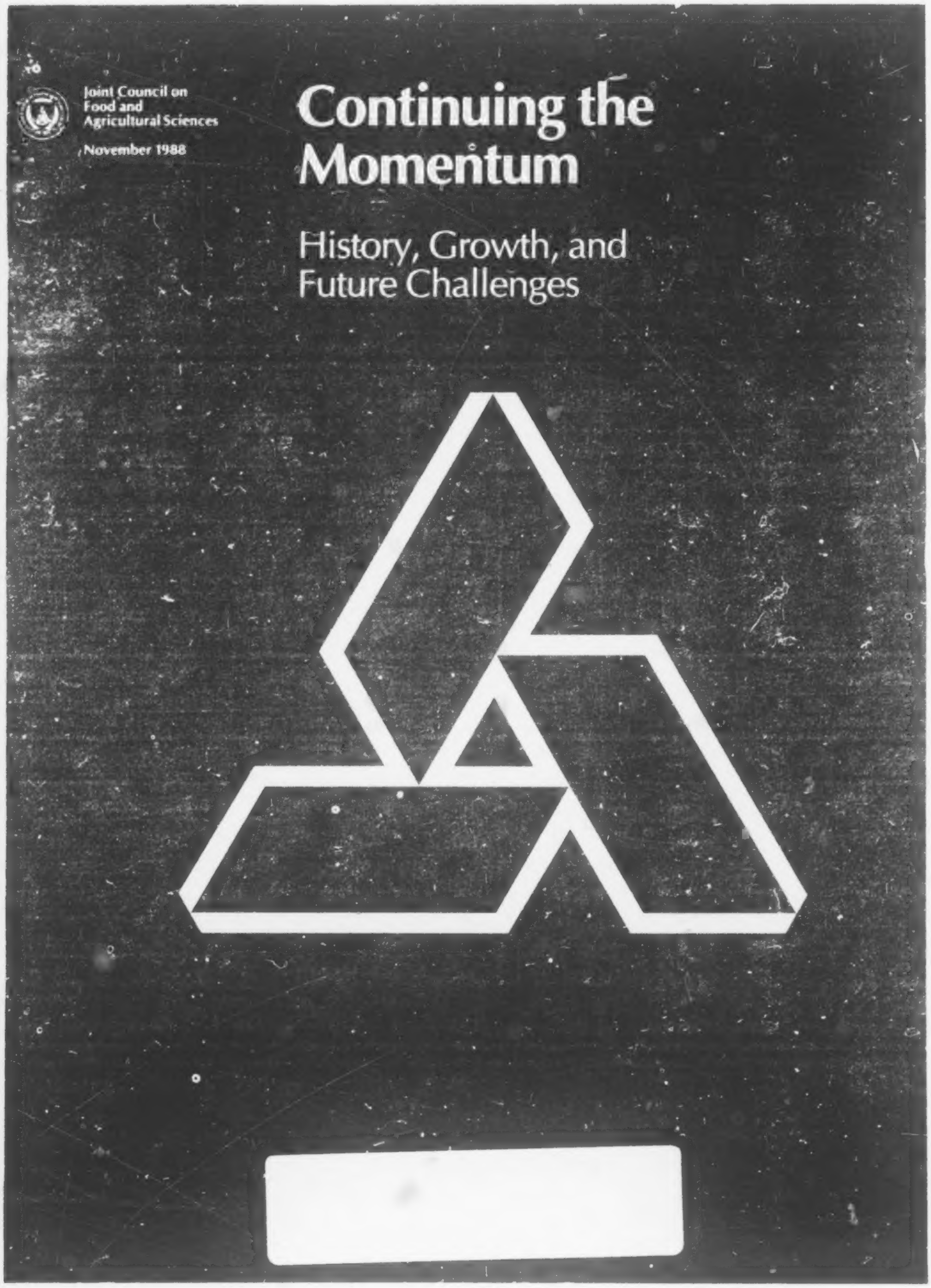
I would like to call your attention to another report which is distributed quarterly to the appropriate committees of Congress, the Agricultural Research Service Accomplishments Report. This report contains the most current research results from the ARS system. You will find many of the results consistent with the earlier recommendation of the Joint Council.

I might also mention that in that there is yet another body which often sets priorities, the Congress. Through hearings, legislation, report language, and communications with Members, we are made aware of the priority concerns of the Congress.

There are also those priorities which are developed within the framework of the administration of my office. I have asked each of the science and education agency administrators to assist me in developing goals and objectives. I have already indicated that one of my personal priorities is to carefully examine the funding requirements for agricultural science and education. There are a number of proposals circulating, including one from the National Research Council. I assisted in the development of this proposal, and I now must look at it in the context of the overall budget picture.

Mr. Chairman, I welcome the opportunity to respond to your questions.

[The document entitled "Continuing the Momentum" follows:]



Joint Council on
Food and
Agricultural Sciences

November 1988

Continuing the Momentum

History, Growth, and Future Challenges

The Joint Council on Food and Agricultural Sciences was established by Congress in 1977 to encourage and coordinate research, extension, and higher education activities in the food and agricultural sciences throughout the United States. Its members, who are from both the public and private sectors, represent producers, industry, and State and Federal agencies and institutions. The Council's role was strengthened in the 1981 Agriculture and Food Act, which directed the Department to improve the planning and coordination of research, extension, and higher education within both the public and private sectors and to relate the Federal budgeting process to the overall functioning of the system. The Joint Council's responsibilities were reaffirmed in the Food Security Act of 1985.

The Joint Council recently decided to prepare and publish *special reports*, in addition to those mandated by Congress, that deal with topics or issues significant to the food and agricultural science and education system. This topical report is one such report. *Continuing the Momentum: History, Growth, and Future Challenges* summarizes the planning activities within the food and agricultural science and education system, relates the creation and initial activities of the Joint Council on Food and Agricultural Sciences, and sets forth future challenges facing the Council.

The Joint Council publishes a number of Congressionally mandated reports. The first such report was a long-term (20 years) *Needs Assessment* of the food, fiber, and forest products sectors. This report established the initial planning document that has guided the Joint Council as it fulfills its other responsibilities.

The Joint Council prepares three other regularly published reports. A *Five Year Plan* is published biennially, and denotes the issues and challenges facing the food and agricultural science and education system together with the goals and objectives necessary to satisfactorily address them. The annual *Priorities Report* outlines the current national emphases of research, extension and higher education for the next fiscal year. An *Accomplishments Report*, also published annually, summarizes significant accomplishments of the food and agricultural science and education system.

These three reports constitute an overall strategic planning and review process for the food and agricultural science and education system. This process facilitates and enhances the coordination, planning, and financial relationships through which short-term and longer term future needs are defined, goals and objectives established, and accomplishments noted. The reports provide the foundation for planning an efficient and effective means for meeting the future national and international demands for food, fiber, and forest products.

The Joint Council symbol represents the Council's primary responsibility: to improve coordination and planning among research, extension, and higher education programs. It also characterizes the cooperative spirit that exists among the Federal, State, and private organizations and institutions within the food and agricultural science and education system.

Joint Council on Food and Agricultural Sciences

Secretariat:
Suite 302 Aerospace Building
U.S. Department of Agriculture
Washington, D.C. 20250-2200

November 7, 1988

Honorable Richard E. Lyng
Secretary of Agriculture
Washington, DC 20250

Dear Mr. Secretary:

In 1988, the Joint Council on Food and Agricultural Sciences completed its first ten years of efforts dedicated to improving planning and coordination within the food and agricultural science and education system. To mark this achievement and to set the stage for future activities, we asked Dr. Larry Miller, Executive Secretary to the Joint Council, to prepare a special Joint Council report that:

- provides a historical perspective of planning and coordination efforts within the food and agricultural sciences;
- summarizes the growth and evolution of the Joint Council; and
- sets the stage for future Joint Council endeavors.

This report is enclosed for your information and use. We believe it accurately, yet concisely, provides an excellent perspective of the past, describes the activities of the present, and delineates challenges for the future.

On behalf of the Joint Council, we are pleased to convey Continuing the Momentum: History, Growth, and Future Challenges to you.

Sincerely,

Orville G. Bentley
ORVILLE G. BENTLEY
Cochairman

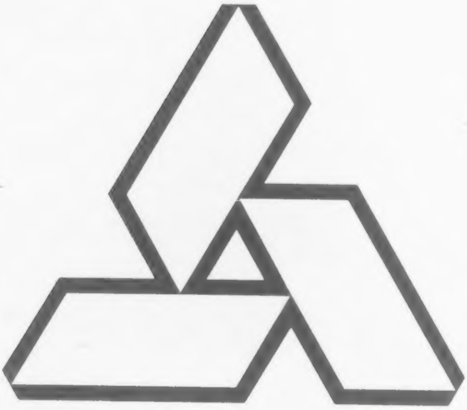
Charles E Hess
CHARLES E. HESS
Cochairman

Enclosure

The Joint Council fosters coordination and planning in public and private research, extension, and teaching in the food and agricultural sciences

Continuing the Momentum

History, Growth, and Future Challenges



By
Larry R. Miller
Executive Secretary
Joint Council on Food and
Agricultural Sciences

Editorial services were provided by Mary Ann Wamsley, Information Impact. Typing was done by Anna Marie Salter, CSRS. Mark R. Bailey, Leader, Joint Council Reports Staff gave insightful and significant advice and assistance during the preparation of this report.

Introduction

In the aftermath of World War II, American agriculture underwent dramatic adjustments. The 1940's and 1950's were a time of massive demographic shifts and rapid technological development. Agriculture's major technological advances resulted from increased mechanization and expanded use of agricultural chemicals. The unparalleled production in U.S. agriculture was the envy of the world. Agricultural research and extension led the way in integrating knowledge to improve production efficiency, and universities proudly produced agricultural scientists and educators for the next generations.

From the late 1960's through the 1970's, however, social responsiveness was a growing concern. As public agricultural research expanded rapidly, critics expressed concern that it often was not focused toward long-term national issues and concerns and that researchers were giving inadequate attention to the long-term consequences of new technology. They also criticized unnecessary duplication of effort and urged regional and national planning and coordination to enhance the social responsiveness, cost-effectiveness, and political acceptability of publicly supported agricultural research.

Many of the critics of agricultural research received considerable attention. Through highly visible publications such as *Hard Tomatoes, Hard Times*[1] and the "Pound Report,"[2] they called for a new agenda for the agricultural research community.

Initial Planning Efforts—Research, Extension, Higher Education

Meanwhile, the agricultural research community already had taken steps to improve coordination and planning. The State experiment stations, through the Experiment Station Committee on Organization and Policy (ESCOP)[3], and the Department of Agriculture had formed the Committee on Agricultural Science (1962) and the Agriculture Research Planning Committee (1964). The forest research community was actively involved in research planning through the McIntire-Stennis Cooperative Forestry Research Advisory Board (1962) and the Association of State College and University Forestry Research Organizations (ASCUFRO) (1964). The Current Research Information System (CRIS) became available in the late 1960's to assist in information management and research coordination. Regional research funding continued in accordance with the authorization in the Research and Marketing Act of 1946.

The Agricultural Research Policy Advisory Committee (ARPAC) was formed in 1969 to help coordinate State and Federal research planning activities. By 1974, ARPAC membership had broadened to include forestry, the 1890 land-grant institutions, and USDA agencies. ARPAC further broadened its role by developing 5-year priorities and dealing with major issues such as the concern over the future availability of food. Despite its considerable success, ARPAC's potential was limited by the lack of an official congressional sanction, inadequate support staff, and less than full commitment by many of its member institutions.

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[1] Hightower, J. (1972). *Hard Tomatoes, Hard Times: The Failure of the Land-Grant College Complex*, Agribusiness Accountability Project, Washington, D.C.

[2] National Research Council. (1972). *Report of the Committee on Research Advisory to the U.S. Department of Agriculture*, (often referred to as the "Pound Report") National Technical Information Service, Springfield, Va.

[3] ESCOP is an executive committee of the experiment station section of the Division of Agriculture, National Association of State Universities and Land-Grant Colleges.

Although the Extension community was not using these same kinds of structured regional and national planning and priority-setting processes, the Extension Committee on Organization and Policy (ECOP)[4] worked with USDA to conduct several major studies that helped focus extension activities on the significant issues. For example, the 1958 publication *The Cooperative Extension Service...Today: A Statement of Scope and Responsibility*[5] emphasized the need to reach a wider array of interest groups with educational services.

Extension, too, faced the impacts of the social conflicts that permeated the United States during the 1960's and 1970's and responded by increasing its social and economic development programs. Recommendations were outlined in the 1968 report *A People and a Spirit.*[6] As the 1980's began, evaluations and reviews of extension activities led to a revised policy statement entitled *Extension in the 80's.*[7] During the mid 1980's the Cooperative Extension System launched a major effort to refocus its program priorities around significant national issues. It also had a Futures Task Force conduct a public review of its program delivery and organizational systems. Formal planning activities involving both research and extension were minimal in the 1960's and 1970's, however, especially at the regional and national levels. Regional planning was not formalized nor aggressively encouraged by the extension community, mainly because most programs are implemented at the State level.

During the late 1960's and 1970's, the resident instruction community experienced much larger enrollments, particularly in forestry and in the environmental sciences. Significant changes in the composition of the student population also occurred at this time. Enrollments peaked in the late 1970's and have subsequently dramatically declined at many institutions. These changes raised important questions concerning the type of curriculum needed for the new student population. They were addressed in a study conducted by the Resident Instruction Committee on Organization and Policy (RICOP)[8] to determine the most appropriate curriculum. RICOP also served as a forum for the exchange of information among its members and for planning at the university level. While information exchange took place for the purpose of improving academic program design and delivery, there was little national or regional planning or priority-setting before the 1980's. Formal linkages did not exist between RICOP and the USDA because agricultural teaching responsibilities resided in the Department of Education.

[4] ECOP is an executive committee of the extension section of the Division of Agriculture, National Association of State Universities and Land-Grant Colleges.

[5] *The Cooperative Extension Service Today: A Statement of Scope and Responsibility.* (1958). Madison, Wi.: Extension Committee of Organization and Policy, Subcommittee on Scope and Responsibility.

[6] *A People and a Spirit.* (1968). (A Condensation of the Report of the Joint USDA-NASULGC Study Committee on Cooperative Extension), Fort Collins, Co.: Colorado State University, Printing and Publications Service.

[7] *Extension in the 80's.* (1983). Madison, Wi.: University of Wisconsin, Program Development and Evaluation of the Cooperative Extension Service.

[8] RICOP is an executive committee of the resident instruction section of the Division of Agriculture, National Association of State Universities and Land-Grant Colleges.

The 1977 Farm Bill designated USDA as the Federal Government's lead agency for higher education in the food and agricultural sciences. The USDA Higher Education Programs office was not established until 1978, following the transfer of responsibilities to USDA.

Throughout the 1960's and 1970's, research, extension, and higher education activities at the State and institutional level were not being questioned by the critics to the same degree as were Federal activities. Even so, although considerable planning and priority-setting were occurring at those levels, the efforts were not considered adequate.

A Congressional Mandate

Congress concluded that there was a problem of insufficient coordination among agencies conducting Federally supported research and expressed concern that research results were not being transferred efficiently to appropriate user groups. Additionally, Congress clearly implied that there should be a single voice to represent the food and agricultural science and education system. In response to these needs, Congress established the Joint Council on Food and Agricultural Sciences in 1977.

In Title XIV of the Food and Agriculture Act of 1977, Congress stated: "The primary responsibility of the Joint Council shall be to foster coordination of the agricultural research, extension, and teaching activities of the Federal Government, the States, colleges and universities, and other public and private institutions and persons involved in the food and agricultural sciences."

Congress also charged the Joint Council with the responsibility to:

- provide a forum for exchange of information.
- analyze and evaluate the economic, environmental, and social impacts of agricultural research, extension, and teaching programs and submit annual reports identifying high-priority research areas.
- develop and review the effectiveness of a system for compiling, maintaining, and disseminating information about federally supported agricultural research or extension projects, including private agricultural research and extension to the extent possible.
- develop, review, and evaluate memorandums of understanding.
- develop recommendations describing current and long-range needs, priorities, and goals in the food and agricultural sciences.
- recommend coordinated national and regional agricultural research, extension, and teaching programs.
- report on significant agricultural achievements.

The 1977 legislation that created the Joint Council was significant for two reasons. First, the congressional mandate gave the Joint Council a high degree of visibility. Second, the new measure provided for broader responsibilities and wider member representation than had existed in previous planning bodies. The responsibilities spanned coordination, planning, and evaluation in the areas of public agriculturally related research, extension, and teaching. Linkages to other components of the food and agricultural science and education system are illustrated in Appendix 1.

The broadened membership included land-grant universities (both 1862 and 1890 universities), State colleges and universities (non-land-grant institutions), USDA science and education agencies, the White House Office of Science and Technology Policy (OSTP), foundations, and private industry. In addition to the traditional agricultural representation, home economics, veterinary medicine, and forestry were included as part of the planning process. Appendix 2 shows the organizational representation on the Joint Council.

Higher education (teaching) was now a partner along with research and extension. This addition was particularly important to the non-land-grant colleges and universities, another new group invited to participate in the planning activities.

Thus, the Council was designed to provide a forum through which broad food and agricultural science issues could be addressed by a diverse but interested group, including many entities and organizations that had not been a part of traditional agricultural planning and coordination endeavors.

Organizational Structure of the Joint Council

Use of Existing Infrastructure: To minimize duplication of efforts, the Council decided to use existing planning and coordination mechanisms such as ESCOP, ECOP, RICOP, ASCUFRO, and the organizational structure established by ARPAC. This took advantage of common interests and built upon existing linkages.

Membership Appointments: Nominations for membership on the Joint Council are submitted to the USDA Assistant Secretary for Science and Education by the member organizations. Recommendations are reviewed by the Executive Committee of the Joint Council and forwarded to the Secretary of Agriculture for selection. Members are appointed for a maximum of two 2- or 3-year terms.

National Committees and Regional Councils: To fulfill the congressional mandate, the Joint Council established national committees for research, extension, and higher education (teaching) to ensure a national perspective for each function. Regional councils of the Joint Council were established to provide regional coordination and integration of research, extension, and higher education activities. The Committees and Councils were encouraged to take an active role in selecting priorities, improving coordination, raising issues for discussion, and submitting recommendations to the Joint Council. While the establishment of four regional councils was envisioned, only two (Northeast and Western) currently function as Joint Council entities and formally contribute to the Joint Council planning and priority-setting activities. Each Committee and Council has established a mission statement, a procedure for selecting and rotating membership, and operating procedures.

Cochairs: Two cochairs provide leadership to the Joint Council. The enabling legislation identifies the USDA Assistant Secretary for Science and Education as one cochair and a nonfederal member of the Council as the other.

Executive Committee: An Executive Committee provides overall guidance for the Council and recommends policy and procedures for the Council's consideration. The Executive Committee includes the cochairs of the Council and a small number of Council members selected by the cochairs.

Executive Secretary: The Executive Secretary, who reports to the cochairs of the Joint Council, carries out the daily management of the Council with guidance from the cochairs and the Executive Committee as needed. The Executive Secretary recommends and develops meeting agendas; plans, organizes, and provides followup to the Joint Council and Executive Committee meetings; manages the operating budget; facilitates Joint Council membership nominations; actively participates in the meetings of the National Committees and Regional Councils to assure a direct linkage to the Joint Council; and coordinates and provides liaison with numerous other organizations and groups. The Executive Secretary also works closely with the Council's reports staff and provides advice and guidance, as appropriate.

Reports Staff: The Council recognized that annual reports of priorities and accomplishments would be necessary in order to meet Congressional mandates. Initially, from 1978-1982, the Joint Planning and Evaluation Staff of the Science and Education Administration supplied staff support for preparing these reports. However, because USDA reorganization abolished the Joint Planning and Evaluation Staff and because additional reports were mandated by the 1981 Farm Bill, it was necessary to establish a Joint Council reports staff and de facto staff leader. The Joint Council reports are currently prepared by a staff consisting of representatives from USDA science and education agencies (ARS, CSRS, ES, ERS, and FS). One representative is appointed as a full-time leader of the Reports Staff by the Council cochairs; the other members serve on a part-time basis. Appendix 3 provides a diagram of the Joint Council operational organization.

Reports: The process for preparing the mandated reports has continually improved throughout the history of the Council. Joint Council members, National Committee and Regional Council members, numerous scientists and educators, and other leaders in the food and agricultural sciences are directly involved in preparing and reviewing the reports. Priorities are identified annually by each National Committee and Regional Council and then submitted to the Joint Council. The Council reviews these recommendations and selects and ranks national priorities for submission to the Secretary of Agriculture. The National Committees also submit examples of science and education accomplishments, from which the Council selects a representative sample to be included in the annual accomplishments report. Preparation of the biennial Five-Year Plan for the Food and Agricultural Sciences involves the Joint Council members as well as several selected scientists and administrators in industry, universities, and USDA. A summary of the Joint Council publications is shown on the inside cover of this report.

Growth of the Council

Following the original organization and definition of responsibilities in early 1978, the Joint Council initiated several activities. In its early stages, the Council concentrated on information sharing, program analyses, and budget development. The Council members strove to define and gain an understanding of the potential role of the Council and to establish a credible organization that could make a significant contribution to improving coordination and planning. As the Council matured and embarked on significant projects, the mutual respect that developed among the members helped reduce tensions and apprehensions.

The role of the Joint Council was strengthened bv the Agriculture and Food Act of 1981, which directed USDA to improve planning and coordination of research, extension, and higher education within the public and private sectors, and to relate Federal budget development and program management to these processes. Congress requested the Secretary of Agriculture to develop a long-term needs assessment (20 to 30 years) for food, fiber, and forest products and to describe the research, extension, and higher education requirements to meet the identified needs. The Secretary asked the Joint Council to fulfill the responsibility.

During the time when the long-term needs assessment was being initiated, USDA implemented a significant reorganization of the science and education related agencies resulting in the abolishment of the Science and Education Administration and, thereby, its Joint Planning and Evaluation Staff. As a result, the need for planning and coordination at the national level was increased considerably.

The planning, preparation, and review of the *Needs Assessment* (published in January 1984) was a major undertaking which permitted all the Joint Council members to make positive contributions to an important effort. This task served as a vehicle for team building, contributed to the rapid maturing of the Council, and provided a concrete rallying point for its members. As the needs were being formalized, they were kept relatively broad. As a consequence, consensus was attained and all members were able to positively support the recommendations. The *Needs Assessment* was viewed as a document that represented a consensus of the entire food and agriculture system.

Concurrent with the preparation of the *Needs Assessment*, the Council established a process for developing national priorities for research, extension, and higher education. The process incorporated a systematic procedure for actively involving representatives from all sectors of the science and education system. In 1983 a single set of national priorities was selected and ranked for the fiscal year 1985 science and education budget. Specific budget recommendations were deliberately avoided, thereby setting the stage for broad support for each priority topic. This was the first time that a brief list of combined research, extension, and higher education priorities had been selected and ranked by such a broad array of scientific disciplines and public educational institutions. This process of selecting and ranking priorities evolved to become a significant activity which integrated input from many organizational components of the food and agricultural science and education system. In the 1980's numerous major planning and issue identification activities served as valuable input to the Joint Council. Examples include: Research initiatives developed by ESCOP/USDA-Cooperative State Research Service and the national initiatives for the Extension System developed by ECOP/USDA-Extension Service.

This consensus-building process promoted coordination of the research, extension, and teaching functions while stressing individual and combined contributions. Competition among the actors within the science and education system was dissipated through focusing on a common set of priorities.

This approach has led to many successful efforts, particularly those cutting across multiple functions and organizations. For example:

- The Council provided a single focus on the need to enhance the development of scientific expertise in the food and agricultural sciences, a primary responsibility of colleges of agriculture and related sciences. This was supported not only by the higher education community but also by research and extension components in agriculture, home economics, veterinary sciences, and forestry in the land-grant universities and other State colleges and universities.
- The Council's continued emphasis on agricultural biotechnology helped set the stage and provide justification for an expanded competitive research grants program. The deliberations on biotechnology involved representatives from numerous universities, private industry, USDA agencies, and other agencies such as the National Academy of Sciences , the National Institutes of Health , the National Science Foundation , and the Office of Science and Technology Policy .
- The priorities selected by the Joint Council have been firmly espoused by the USDA Assistant Secretary for Science and Education. They have been used in discussions with administrators and policymakers throughout the food and agricultural sciences system and also with such groups as the U.S. Congress, Office of Management and Budget , Office of Science and Technology Policy, the National Science Foundation, the Department of Defense, the Environmental Protection Agency, and the National Institutes of Health. Through these efforts, agriculture has become an important part of the science arena, and the interface between science and policy has been strengthened.

Credibility Enhancement of the Council

The Council became more and more aware of the need to link science to policy and to societal issues in the planning and priority-setting processes. The Council exemplified these linkages in the focus of the issues presented in the Council reports. The Council's credibility grew as it became a recognized voice for the food and agricultural science and education system. Consequently, the State-Federal science and education partnership has been strengthened. As the Council's planning activities continued to evolve, more emphasis was placed on developing program goals and objectives that related to broad issues and goals rather than on proposing specific programs. This further reduced competition and tension among the participants in the planning process.

The planning documents—the *Five-Year Plan for the Food and Agricultural Sciences* and the *Fiscal Year Priorities for Research, Extension, and Higher Education*—became more widely used by university and USDA administrators. Selection of highly respected scientists and educators to contribute significant sections of the reports strengthened the scientific credibility of the documents and increased "grassroots" awareness of Council activities. Resource allocation at the university and Federal level became increasingly linked, at least in a general way, to the areas of emphasis embraced in the Joint Council planning documents.

Several other organizations formed in the past few years complement the Council's activities:

- The Council of Agriculture Research, Extension, and Teaching (CARET) was formed in 1982 by the Council of Administrative Heads of Agriculture (CAHA).[9] CARET, a voluntary citizens organization, provides support for land-grant and USDA programs across the three functions.

- The National Association of Professional Forestry Schools and Colleges (NAPFSC) was formed in 1981. NAPFSC established functional committees for planning and coordination to support forestry research, extension, and teaching programs at the university level.

- Congress created the National Agricultural Research and Extension Users Advisory Board in its 1977 Farm Bill to advise the Executive Branch and Congress on agricultural science and education issues from a user's viewpoint. The Joint Council and the Users Advisory Board meet jointly at least once each year to exchange information and discuss current important agricultural issues.

Many additional factors have played a role in developing the Joint Council's credibility. The Council has dealt with an extensive array of broad issues, including rural revitalization, competitiveness and profitability, family economic well-being, and human capital development. In 1984 the Council made a special effort to improve international cooperation and coordination. An invitation was extended to the cochairs of the International Science and Education Council (ISEC) and the chairman of the Board on International Food and Agricultural Development (BIFAD) to actively participate in Joint Council activities.

The Department and the nominating organizations make a conscientious effort to select the best representatives for membership on the Council. Members are strongly encouraged to provide two-way communication between the Council and the organizations that they represent. Actively involving each member in the activities of the Council continues to maintain a sense of *esprit de corps* among the members.

Joint Council meetings are designed to provide (a) information exchange, (b) an opportunity for decisionmaking and/or recommendations, and (c) challenging discussion on significant issues. Council members are actively involved in each component of the meetings. Council members do not simply endorse staff-prepared reports; instead, working sessions provide members the opportunity to review draft reports and to make specific comments and suggestions. All members are included in discussions of the future direction and emphasis of the Council. This self-evaluation and goal-setting process reinforces *esprit de corps* and enthusiasm.

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[9] CAHA is a council of the Division of Agriculture, National Association of State Universities and Land-Grant Colleges.

Future Growth of the Council

The Council recognizes that its role will change as new challenges and issues arise. Some future directions are already apparent:

- The need to better illustrate how the accomplishments of the science and education programs contribute to resolving societal problems.
- The need to communicate with a wider public audience to foster greater appreciation for the significant role of food and agricultural science and education in bettering societal conditions.
- The need to encourage interdisciplinary and interagency activities to more efficiently and more effectively solve complex problems.
- The need to bring into the forefront emerging issues which research, extension, and teaching systems will address in the future.

The Joint Council has attained such a level of maturity and recognition within the system that the procedures for obtaining information and preparing mandated reports have been clearly accepted. The current process ensures that both the Council's deliberations and its published reports have the benefit of significant contributions from a wide variety of interests, both within and outside the system.

As a changing group operating in a changing environment, however, the Joint Council faces situations that can affect its future directions. As a result of normal rotations and changes in professional positions, for example, 30 percent of the membership sometimes changes within a period of less than 2 months. Changes in administrations, too, can result in membership changes and shifts in the emphasis given the Council by the Secretary's Office.

The Council must continue to face the challenge of maintaining the continuity and momentum necessary to be a significant voice in the food and agricultural science and education policy arena if it is to satisfactorily carry out its responsibilities.

Assuring Continuity and Momentum

As the Council continues to mature and accept more complex responsibilities, a significant portion of its agenda will focus on providing the leadership and guidance for setting program goals, facilitating the exchange of information on complex issues, and articulating the societal benefits of the food and agricultural science and education system.

Expanded Mission and Scope: The Joint Council recognizes and fully supports its primary mission of (1) facilitating coordination and planning within the food and agricultural science and education system and (2) linking that planning with the budget development process. To assure that it will be able to exercise its leadership responsibilities in the future, however, the Council has outlined several actions and tasks that expand the mission and scope of its activities.

Strengthening the coordination, planning, and facilitation roles of the Council and its individual members will be given high priority. The Council also will place more emphasis on identifying emerging issues that affect the food and agricultural science and education system. To that end, the Council will pursue the following:

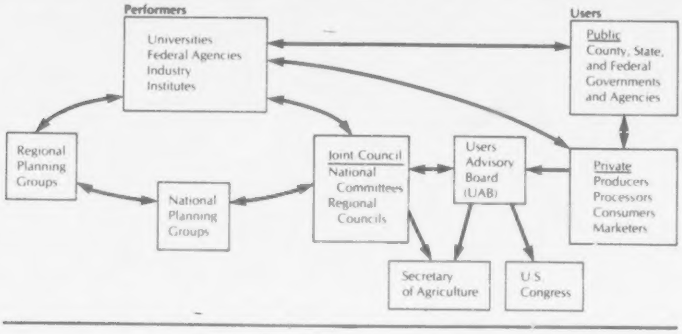
- Broaden the base of input for planning, coordination, and the definition of problems.
  - — Identify and seek the involvement of appropriate public and private audiences that have interest in, are affected by, or have an effect on Council activities.
  - — Expand the Council's capability to organize and conduct analyses and evaluations of the economic, environmental, and social impacts of science and education programs.
- Expand the use of Council-generated information to improve public understanding of the societal benefits of research, extension, and teaching.
  - — Give greater emphasis to conveying appropriate Council-generated information and other pertinent information to groups that have an impact upon Council activities, such as congressional committees, the Office of Management and Budget, the Environmental Protection Agency, and other agencies outside USDA.
  - — Improve the linkages of priorities and areas of program emphasis to budget development across the public arenas.
  - — Organize briefing material for new Council members and other interested groups that explains the Council's history, responsibilities, organization, and operating procedures.
- Prepare and distribute information in addition to mandated reports.
  - — Prepare monographs or issue papers, as appropriate, on significant issues, both current and emerging.
  - — Facilitate and encourage symposiums/forums to generate alternative solutions to defined problems, identify the appropriate entities for action, and assess the significance of emerging issues.
  - — Design and distribute other products, as appropriate, that enhance the planning and coordination role of the Joint Council.

Conclusion

The Joint Council on Food and Agricultural Sciences has reached a significant level of maturity through consensus building and improved communication in the food and agricultural sciences. Throughout its period of growth, the Joint Council adopted very few formal operating procedures, preferring instead to permit procedures and linkages to be formed as they appeared to work best. Recognizing its expanded responsibilities, the increasing complexity of its procedures, and the increased significance of its reports, the Council has determined that a better specification of its mission, responsibilities, and future agenda is needed to help assure continuity and momentum into the future. A resilient structure will be encouraged to allow the Council to effectively respond to the issues and challenges that face the food and agricultural science and education system in the future. The Council accepts the challenge to elevate its agenda to a higher plane by providing stronger leadership to the food and agricultural science and education system.

Appendix 1

Food and Agriculture Science and Education System


Performers
Users
Universities
Federal Agencies
Industry
Institutes
Public
County, State, and Federal Governments and Agencies
Regional Planning Groups
National Planning Groups
Joint Council
National Committees
Regional Councils
Users Advisory Board (UAB)
Private
Producers
Processors
Consumers
Marketers
Secretary of Agriculture
U.S. Congress

Appendix 2

Organizational Representation on the Joint Council

- Land-Grant Colleges and Universities:

  Administrative Heads of Agriculture (CAHA)
  Extension (ECOP)
  Resident Instruction (RICOP)
  Research (ESCOP)
  Forestry (NAPFSC)
  Veterinary Medicine
  International Programs (ICOP)
  1890 Research
  1890 Extension
  Home Economics

- American Association of State Colleges and Universities (AASCU)

- The American Association of State Colleges of Agriculture and Renewable Resources (AASCARR)

- Foundations

- Private Industry/Producers

- U.S. Department of Agriculture

  Assistant Secretary for Science and Education*
  Agricultural Research Service (ARS)
  National Agricultural Library (NAL)
  Forest Service (FS)
  Economic Research Service (ERS)
  Extension Service (ES)
  Cooperative State Research Service (CSRS)
  Office of International Cooperation and Development (OICD)
  Higher Education Programs (HEP)
  Soil Conservation Service (SCS)

- White House Office of Science and Technology Policy (OSTP)

- International Organizations

  International Science and Education Council (ISEC)
  Board on International Food and Agricultural Development (BIFAD)

- National Agricultural Research and Extension Users Advisory Board (UAB)

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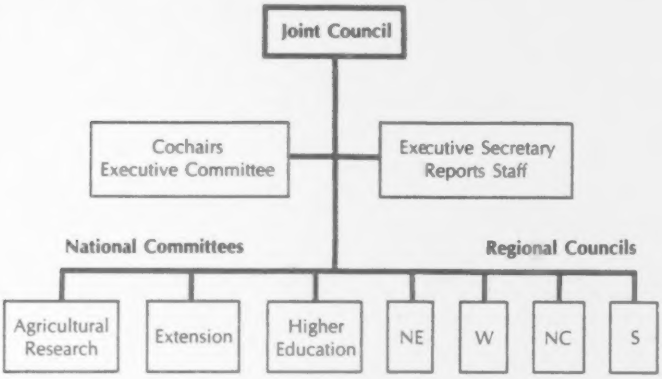
*Designated Federal cochair of the Joint Council on Food and Agricultural Sciences by the U.S. Congress.

Appendix 3

Joint Council Operational Organization


Joint Council
Cochairs
Executive Committee
Executive Secretary
Reports Staff
National Committees
Regional Councils
Agricultural Research
Extension
Higher Education
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S

STATEMENT OF DR. WILLIAM E. MARSHALL, PRESIDENT PIONEER HI-BRED INTERNATIONAL, INC., MICROBIAL GENETICS DIVISION

My name is William E. Marshall. I'm President of the Microbial Genetics Division of Pioneer Hi-Bred International, Inc. in Des Moines, Iowa. The Microbial Genetics Division utilizes microbiology to produce products of benefit to agriculture. Pioneer Hi-Bred is the largest independent seed corn company in the world.

For five years I served as Chairman of the National Agricultural Research and Extension Users Advisory Board and for three years served on the Advisory Panel of the Office of Technology Assessment on New Developments in Biotechnology. I also served on a study panel of the National Research Council's Board on Agriculture, evaluating competency in agricultural curricula of our land-grant colleges of agriculture. At present I serve on the Advisory Committee on Intellectual Property Matters to the GATT.

It is my privilege to be here and speak to you today on the private sector's view of the current priority mechanisms used within the Science and Education Agency of the Department of Agriculture.

First let me say that no one who has taken the time to study the agricultural research programs of the United States has any basis for criticism. The objectives of the system over the past 100 years have been met and met well, and in fact, their accomplishments surpassed even their own hopes and desires. Our agricultural research, education systems and extension are the envy of the world and have become models upon which other systems have been formed.

The criticism that I hear today from the private sector, and I would say it is fairly general, is that the present priority-setting mechanisms and funding procedures may not permit the continued high success rate of our traditional agricultural research system. The scientists and administrators in our public research establishment would like to say, "We did it before and we can do it again." There are, however, some genuine misgivings about the traditional establishment's ability to do that in the future. By traditional agricultural establishment I mean those organizations funded by Science and Education, namely; CSRS (Cooperative States Research Service), ARS (Agricultural Research Service) and CES (Cooperative Extension Service.)

The basis for this concern is the result of changes in the world external to the traditional agricultural research establishment which have not been met by changes in ARS, CRS and CES. The people in these organizations are just as good as they always have been. The system can be just as proud as ever of its achievements. But the concern rises from the knowledge their external world has changed.

1. We have serious competition from overseas, especially from foreign nations with deep pockets to match our subsidies.
2. We have a growing need to protect our environment for future generations of Americans.
3. We have come "eyeball to eyeball" with a new science and technology arising from a better understanding of the molecular genetics of animals and plants.

The present system with its present priority-setting mechanisms can handle #1, especially by working with other organizations within the USDA (e.g., ERS). But it has a difficult challenge with #2 and with #3. The system has some capability to handle acid rain but lacks a sufficient science base to tackle groundwater pollution or sort out the potential of molecular biology.

Besides the lack of science base, the private sector also believes that the present system may lack the necessary leadership and even be hampered by its structure. The system as it has grown since the days of President Abraham Lincoln has become very politicized. Many groups claim to speak on behalf of agriculture, the private sector, farm groups, legislative blocs, trade associations and academics. Until recently the system has readily found dollars available for any bottoms-up research proposal developed within the laboratories. Pork barreling has become a way of life and is now openly rationalized. In these circumstances leadership is difficult.

To make the situation even more recalcitrant to change, we have structural hurdles to overcome. Most of our colleges of agriculture do not have the basic science departments that will be required to adjust to the new fundamental technologies of molecular biology that are coming out of our colleges of arts and sciences. Likewise our ag students will not find jobs as readily in agricultural research as they have in the past without this training. Even today, almost 50% of the Ph.D's working in agricultural research did not graduate from a college of agriculture.[1]

But to the question of priorities, I would respectfully submit the following:

1. We need low-priced technologies to match the low prices of commodities.
2. We need technologies that are at least environmentally friendly, if not regenerative.
3. We need technologies that are size neutral.
4. We need basic science curricula that will expand the knowledge base of our students.
5. We need alternate crops.

The need for low-priced technology will require some totally new scientific approaches. For the past 100 years, as long as markets were expanding and as long as government subsidies were available the private and public sector gave very little thought to the cost of input technologies. Now with increasing foreign competition as well as the drop in commodity prices, we need to start thinking as we have never thought before. From 1976 to 1985 production costs in growing corn or beans rose the equivalent of 22 bushels an acre.[2] That is, a farmer had to produce 22 more bushels per acre in 1985 than in 1976 simply to cover the incremental costs of production during that nine-year period for corn or beans. And we all know that production costs were already high in 1976. The system needs to put a high priority on research which will lead to truly low-cost inputs, not inputs that are simply paid for by new subsidy programs.

One of my concerns is that the use of biotechnology in the hands of those unfamiliar with agriculture will become a very expensive input. The long lead times for research and development, including regulatory approval, will not serve the farmer well in the ultimate prices that he is asked to pay. It is hard to imagine that genetic engineering will become a low-cost input in the foreseeable future.

The environment represents a broadening of the scope of traditional agricultural research. Preserving the environment is clearly becoming a worldwide concern to both rural and urban dwellers. Agriculture can and should play a big role in preserving the quality of our environment, particularly groundwater.

The chosen scientific approach will be as important as the objective. The wrong approach will be too expensive and may create a different environmental problem. Our colleges of agriculture have a structural problem in not being able to access that science by virtue of their lack of training and its residence in the college of arts and sciences.

"I scarcely ever knew a mammoth farm to sustain itself; much less to return a profit upon the outlay." That was the attitude of Abraham Lincoln in 1859. The ability of a farmer to be profitable is certainly his business and not that of the government. However, technology needs to be profitable for both the small farmer and the large farmer.

We sometimes forget that the land grant colleges of agriculture have the primary objective of teaching our future agriculturalists. It is important that research be done within the system or that it be brought into the system for the purpose of teaching. The scholastic achievement test scores and the graduate record examination scores have fallen too low for agriculture students. At a time when agricultural research is being put to the test and when we need the best students more than ever, entrance requirements should not be allowed to slide but in fact should be stiffened.

Furthermore, our land grant colleges of agriculture and experiment stations are not monolithic. They differ widely in their ability to attract and teach young people. Research programs need to be tailored to improve the capabilities of the faculty as well as the competency of the students.

The development of new alternative crops is an appealing area for use of our lands These crops need not be totally different from our traditional corn, beans, alfalfa, etc. They could represent new hybrids or varieties for specialized industrial or consumer uses. Totally new crops could be brought in; such as kenaf, canola, and triticale. These represent niche markets and as such our ag researchers need to be careful to make certain that they work with the private sector to ensure that these markets are enduring.

To pursue these five priorities will require some new thinking by the organizations funded by Science and Education. It will require some new linkages, new recognitions and new tools. Today. 50% of the Federal government's support for agricultural research does not flow through the U.S. Department of Agriculture.[3] It flows into agricultural research through the other granting agencies such as the National Institutes of Health, the National Science Foundation, the Department of Energy, the Department of Defense, etc. Agricultural research is now being conducted at private universities, and in colleges other than agriculture. We need to recognize that. Therefore, new linkages need to be made.

It appears that it is difficult for most of our state agriculture experiment stations to obtain Federal funds from agencies other than the Department of Agriculture. Only nine of the 57 state ag experiment stations receive more than 10% of their total funding from agencies outside the USDA.[4] And more than 1/3 receive less than 2% of their total funding from agencies outside the USDA. This appears to be a consistent funding over the last five years.

Also, since more than 40% of Ph.D's engaged in agricultural research today did not graduate from colleges of agriculture, it is apparent that the colleges of agriculture themselves are no longer the only seat of research and education for agriculture. Likewise, the faculty of our colleges of agriculture must recognize that good research for agriculture is being conducted by people outside of their faculty and by people who are not graduates of their colleges as well. These men and women are using new tools not generally found within the colleges of agriculture to pursue their research.

The question isn't so much, "What are the high priority objectives for agriculture?" but rather "Aren't these new tools of research and these new concepts of lost-cost technology the priorities that need to be brought into our established agriculture system?"

Frankly, I don't believe that most of these high priorities can be achieved without our traditional agricultural research establishment reaching out to develop these new linkages, new recognitions and new tools. The base of agricultural research has grown larger than the establishment itself. Many of the new technologies are coming out of fundamental science departments which are outside of our colleges of agriculture. These faculties are publishing discoveries which are being read by applied researchers in agriculture around the world within six months. It is important that this time gap be closed and one way of doing that would be to provide a higher likelihood of granting funds to those faculty scientists who collaborate actively with faculty members in fundamental departments outside of the college of agriculture.

We in agriculture can no longer afford to think that Uncle Sam will make up the difference between the cost of our technology and the value of our commodities. We must realize that there are new competitive forces that have the opportunity to create technologies unencumbered by tradition. Our established research organization has served us well for over 100 years, but it carries with it a number of burdens which will make it difficult to change and to adapt. I am concerned that this will allow a window of opportunity to open for foreign competition to develop low cost technologies based on new science and to use it to their advantage and our disadvantage.

Again, thank you for the privilege of appearing with the Assistant Secretary for Science and Education and other administrators within the Department of Agriculture and before your sub-committee.

Thank you Mr. Chairman.

1/ Educating the Next Generation of Agricultural Scientists, National Research Council, Board on Agriculture, 1988.

2/ W.E. Marshall, Applied Agricultural Research, 1:131-136 (1988)

3/ A.R. Bertrand, Inventory of Research, Extension and Higher Education Related to Food and Agriculture, USDA, Science and Education, March 1982.

4/ W.E. Marshall, What the Public System Should be Doing, Ag. History 61:296-302 (1988)

STATEMENT OF CHARLES M. BENBROOK, EXECUTIVE DIRECTOR, BOARD ON AGRICULTURE, NATIONAL RESEARCH COUNCIL

Mr. Chairman, members of the Committee, thank you for the invitation to present testimony to the Subcommittee on Agricultural Research on priority setting mechanisms utilized by the U.S. Department of Agriculture. My comments this morning are based upon recommendations offered in several reports written under the auspices of the Board. I will summarize in general terms the extent to which different types of recommendations relative to R&D priorities and programs have been acted upon. I attach as an Addendum a list of pertinent NRC reports, some of which will be referred to herein.

First, let me emphasize that R&D priorities generally shift rather slowly. Rapid shifts are possible -- and can be desirable -- but occur only rarely when major scientific advances open up important new opportunities to address or overcome problems in new ways. Scientific priorities also can shift more dramatically than routinely is the case when the demands, needs, and expectations placed by society on the food and fiber system dramatically change. Science and technology priorities in food, agricultural, and environmental research are likely to be driven in new directions in the 1990s by both sources of change -- major new scientific capabilities and the new demands and challenges being placed upon the systems.

Our reports survey a number of the most important demands which the system is now being called upon to meet:

- The public's desire for safer, more nutritious food at reasonable prices.
- Better ways to balance production and environmental quality goals.
- Development of new technologies applicable to the conversion of raw agricultural commodities into value-added uses -- both food and non-food.
- Fiscal accountability and responsiveness in order to more effectively utilize scarce public dollars.
- Assuring high-quality science, often organized differently than in the past to give researchers support and encouragement to take on complex, multidisciplinary problem-solving projects.
- Integrating progress -- and human talent -- from across the entire scientific and engineering communities into the day-to-day activities of researchers in all food and agricultural research institutions.

The challenge of improving system responsiveness to emerging needs while also supporting top-quality science should be met head on through a review and reform of the mechanisms used by USDA in allocating funding. This, in addition to rectifying the grossly inadequate level of federal support, is the most important R&D issue the Congress should address in the 1990 farm bill.

Importance of Competitive Grants

Several Board on Agriculture reports stress the importance of expanding reliance across USDA's research programs on peer review and competitive grant funding mechanisms as the most cost-effective way to both attract top quality scientific talent to the food and agricultural research system and to attain a high degree of annual flexibility in funding the most promising areas of research.

One Board report, Improving Research Through Peer Review, focused on the procedures and consequences of peer review in the Agricultural Research Service, and concluded that even within ARS, some research funding should be allocated competitively, and that across the Agency's programs the outcome of routine and credible peer review evaluations should have a more direct, discernible impact on the allocation of resources and personnel advancement within the Agency. Another report, Animal Health Research Programs of the Cooperative State Research Service, stressed the unique importance of competitive grants in stimulating research on the causes of widespread animal diseases and their effective diagnosis and treatment.

Agricultural Biotechnology: Strategies for National Competitiveness, a major report released in 1987, laid out in considerable detail the need for and essential components of a national strategy to more fully exploit the many beneficial applications of biotechnology in the nation's food and fiber industries. A key element in doing so was highlighted by the committee in its principal recommendation, which calls for $500 million annually in competitive grants targeted toward critical applications of biotechnology. Incidentally, the committee which wrote this report and made this bold recommendation in 1987 was chaired by Dr. Charles Hess, then Dean of Agriculture at the Davis campus of the University of California, and now USDA's Assistant Secretary for Science and Education. The Board looks forward to working closely with Assistant Secretary Hess in evaluating both R&D priorities and programmatic needs in the food, agriculture, and environment sciences. We are, of course, particularly eager to work with him in implementing the recommendations in the Hess report.

Capacity to Respond to Emerging Priorities

Our 1987 report on agricultural biotechnology was preceded in 1985 by a major report on biotechnology research in the Agricultural Research Service entitled New Directions for Biosciences Research in Agriculture: High-Reward Opportunities. Both the 1985 and 1987 reports stress many of the same R&D needs. While the ARS and academic sector have made some progress in acting upon the recommendations in our reports, the system's response is constrained by three factors. They are:

- Funding needed to underwrite essential new investments in facilities, equipment, and scientific talent in major new areas of research.
- The challenge of shifting resources from marginal and less productive areas to more promising lines of work; and from outmoded, or too small and isolated research locations to laboratories with the capacity to more effectively pursue cutting edge research and participate in the establishment of new research partnerships.
- Personnel procedures and policies (such as the ARS and academic tenure systems) which make it difficult either to bring in a sufficient number of new scientists, with new skills needed to pursue promising lines of research; or to rotate assignments of existing staff in ways needed to assure that research teams include an optimal mix of scientific expertise to advance knowledge and technology in a given area.
- Institutional barriers to multidisciplinary research, and to the formation and nurturing of partnerships across disciplines, departments, and institutions -- including in some cases private sector research laboratories.

Conclusions From Recent NRC Reports

Our food and agricultural research system has gone through a sometimes difficult period of planning and introspection. Despite very limited new funding, the system has sought constructive ways to respond to recommendations contained in a series of sometimes critical reports issued by external organizations including the General Accounting Office, the Office of Technology Assessment, scientific societies, farm organizations, and others. The role of my institution -- the National Research Council -- is to help identify needs and opportunities, and support positive change within the system. We pursue this role in two basic ways. First, our technical reports identify emerging, promising S&T opportunities, and offer detailed guidance on new directions which USDA and other federal research agencies and programs should pursue. Second, our reports assess the policies and procedures used by USDA, other federal agencies, and state agricultural experiment stations to support food and agricultural research. It is the combination of these two roles which serves as the basis of the following summary statements relative to priority setting mechanisms and the responsiveness of the system:

- There are many effective internal and external priority setting mechanisms and bodies, which generally tend to offer complementary if not largely identical recommendations.

The problem is not an absence of direction to the system. There is, however, a missing link in most assessments of R&D needs -- only areas in need of more emphasis (and resources) are noted; rarely if ever are areas also identified of declining importance (from which funding can be shifted).

- The capacity of the system -- ARS, CSRS, Extension, other agencies and universities -- to coordinate a collective response to emerging needs should be improved, particularly in light of growing tension over turf and budget allocations.

In recent years the three USDA research and education agency heads and planning staff have rarely gotten together to plan, discuss, and coordinate their budget requests prior to the submission of agency budgets to the Assistant Secretary for Science and Education. Several of our reports have stressed the importance of more routine and ongoing coordination and collaboration across the system in planning collective strategies to address major national needs like protecting water quality, advancing competitiveness, and supporting rural economic development and diversification.

An emerging spirit of competitiveness among USDA's research agencies, in contrast to cooperation, is cause for concern. In the years ahead competition for budget and program responsibility is likely to extend beyond USDA and involve several other agencies with either an S&T, or possibly regulatory role. As this occurs, the planning and coordination of federal government activities will place new challenges on existing institutional mechanisms for coordinating policy and budget reviews. Our institution recently completed a report for the Congressional Committees on the Budget assessing how S&T budget priorities are reviewed across the federal government. (See Federal Science and Technology Priorities: New Perspectives and Procedures, NAS/NAE/IOM, 1988).

A last point is emphasized in several of our reports on pest management, nutritional attributes of foods, and resource conservation.

- Complex new demands related to the performance of the food and fiber system are emerging, driven both by public expectations and economic necessity. These demands often place new strains on the research system,

> agribusiness, and the farm community to come up with management-based, environmentally friendly farming systems that utilize genetic and biological resources moreso than chemical inputs, while still achieving high and profitable levels of production. The need for more timely, practical responses to food safety and environmental concerns, as well as our competitiveness, warrants a reassessment of R&D programs and priorities, as well as overall funding levels.

Summary

Congress faces important challenges in drafting the research title of the 1990 or 1991 farm bill, and in deciding upon the proper level of federal investment in different R&D programs. Our reports document instances in which our nation is not utilizing to best advantage a publicly funded R&D system which has been steadily built over a 100-year period. Farmers, consumers, rural businesses, bankers, the biomedical community, corporate leaders, scientists, and hopefully Congressional leaders sense opportunities to more effectively tap science for the benefit of the nation. Our work has been, and will continue to be dedicated to this goal.

I will be glad to answer any questions you might have. Thank you very much for the opportunity to appear this morning.

ADDENDUM

The following reports contain a number of research recommendations. Some address research needs and priorities; others assess programmatic needs. The need for an expanded competitive grants program, better ways to organize the peer review process, and the critical importance of providing new support for multidisciplinary research are highlighted in several reports. The first group of reports are general, focusing on both R&D priorities and programmatic issues. Each subsequent section contains reports within a particular area.

Priority Setting and Program Needs

1. Agricultural Biotechnology: Strategies for National Competitiveness, BA/NRC, 1987.
2. Educating the Next Generation of Agricultural Scientists, BA/NRC, 1987.
3. Improving Research Through Peer Review, BA/NRC, 1987.
4. New Directions for Biosciences Work in Agriculture, BA/NRC, 1985.

Plant and Animal Productivity

1. Agricultural Biotechnology: Strategies for National Competitiveness, BA/NRC, 1987.
2. New Directions for Biosciences Work in Agriculture, BA/NRC, 1985.
3. Alternative Farming, BA/NRC, In Press.
4. Pesticide Resistance: Strategies and Tactics for Management, BA/NRC, 1986
5. Report of the Research Briefing Panel on Biotechnology in Agriculture, COSEPUP/NAS, 1985
6. Animal Health Research Programs of the Cooperative State Research Service: Strengths, Weaknesses, & Opportunities, BA/NRC, 1986
7. Designing Foods: Animal Product Options in the Marketplace, BA/NRC, 1987.
8. The Ecology of Plant-Associated Microorganisms, Board on Basic Biology, Commission on Life Sciences. NAS Press, 1989.

Nutrition, Food Quality, and Health

1. Designing Foods: Animal Product Options in the Marketplace, BA/NRC, 1987.
2. Diet and Health: Implications for Reducing Chronic Disease Risk, FNB/CLS/NRC, 1989.
3. Meat and Poultry Inspection: The Scientific Basis of the Nation's Program, FNB/CLS/NRC, 1985.
4. Poultry Inspection: The Basis for a Risk-Assessment Approach, FNB/CLS/NRC, 1987.
5. The Effects on Human Health of Subtherapeutic Use of Antimicrobials in Animal Feeds, FNB/CLS/NRC, 1980.

Natural Resources and Environment

1. Alternative Farming, BA/NRC, In Press.
2. Pesticide Resistance: Strategies and Tactics for Management, BA/NRC, 1986.
3. Pesticides and Groundwater Quality: Issues and Problems in Four States, BA/NRC, 1986.
4. Soil Conservation: An Assessment of the National Resources Inventory, Volumes 1 and 2, BA/NRC, 1986.
5. Regulating Pesticides in Food: The Delaney Paradox, BA/NRC, 1987.

Engineering, Products, and Processes

1. Designing Foods: Animal Product Options in the Marketplace, BA/NRC, 1987.
2. Agricultural Biotechnology: Strategies for National Competitiveness, BA/NRC, 1987.

Markets, Trade, and Development

1. Technology and Agricultural Policy Conference Proceedings, BA/NAE, (Forthcoming).
2. Designing Foods: Animal Product Options in the Marketplace, BA/NRC, 1987.

TESTIMONY OF MICHAEL J. PHILLIPS, PH.D.
SENIOR ASSOCIATE, FOOD AND RENEWABLE RESOURCES PROGRAM
OFFICE OF TECHNOLOGY ASSESSMENT
U.S. CONGRESS
BEFORE THE SENATE AGRICULTURE, NUTRITION AND FORESTRY COMMITTEE,
SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION
June 20, 1989

THE PRIORITY SETTING PROCESS FOR AGRICULTURAL RESEARCH

Mr. Chairman and Members of the Committee:

Thank you for inviting the Office of Technology Assessment (OTA) to provide testimony today on mechanisms and criteria used in setting U.S. agricultural research priorities. I am Dr. Michael J. Phillips, Senior Associate in the Food and Renewable Resources Program of OTA. Our office has conducted several studies over the past decade that relate to the subject of this hearing. And we are presently conducting a study for the Committee entitled Emerging Agricultural Technology: Issues for the 1990s that will, in part, provide updated information on the subject of this hearing. In your letter inviting OTA to testify you requested views in two areas: 1) an analysis of certain research priorities OTA has suggested over the last decade and to what extent these recommendations have been acted upon by the agricultural research community, and 2) views on various criteria and mechanisms used in establishing research priorities.

Some Research Priorities Identified in OTA Studies

OTA has never been requested to lay out the broad research priorities for the food and agricultural research system. We have, however, in the course of conducting studies in the many facets of food and agriculture determined areas in which we believed the research effort to be insufficient. I will highlight a few examples taken from these studies and provide some information on the extent to which these research directions have been acted upon. In some cases, the link between OTA finding and the action taken is clear. In others the actions were influenced by information provided by OTA and other studies, but it is not feasible to try to separate out the role of OTA from other inputs.

1977: ***Organizing and Financing Basic Research to Increase Food Production***

OTA: Basic research for increasing food production is vital to the understanding of biological processes in plants and animals. If basic research continues to remain static, food and agriculture research will be subject to diminishing returns and eventual exhaustion. The most effective means of allocating additional funds for high-priority research is through a competitive grants program available, on the basis of peer review, to USDA research agencies, State Agricultural Experiment Stations, public and private universities and nonprofit research institutions.

Result: Based on this report as well as others, a competitive grants program was implemented by the U.S. Department of Agriculture for high-priority basic research (1978).

1979: ***Pest Management Strategies***
OTA: Accelerate the shift to Integrated Pest Management.
Result: A number of land-grant universities and USDA established research programs for Integrated Pest Management. Most recently, proposed Senate 1989 amendments to the 1974 Federal Noxious Weed Act stress a focus on biological mechanisms for the control of noxious weeds as opposed to the exclusive use of chemical control. Further, to establish a Center for Noxious Weed Management and Data Collection that will develop an integrated management system for the control of noxious weeds throughout the United States.

1982: ***Impacts of Technology on U.S. Cropland and Rangeland Productivity***
OTA: Congress could direct the Agricultural Research Service to expedite research and development for potentially profitable cropping systems that reduce the need for tillage on highly erosive soils or that reduce the need for high irrigation rates in areas where groundwater resources are being severely depleted.
Result: USDA and many land-grant universities now have programs dealing with low-input sustainable agriculture (LISA) systems to deal with such problems.

1983: ***Agricultural Postharvest Technology and Marketing Economics Research***
OTA: Postharvest technology and marketing economics research in agriculture warrants greater public sector support, based on benefits received, than is currently allocated.
Result: Funding for postharvest technology research in the Agricultural Research Service of USDA increased by approximately 20 percent (1985).

1983: ***Plants: The Potential for Extracting Protein, Medicines, and Other Useful Chemicals***
OTA: Close cooperation is needed among Government, industry, and universities in new crop development research to bridge the gaps between basic and applied (both agronomic and industrial) research. The respective roles of academia and the private and public sectors should be examined and public policy should be directed toward the goal of improving cooperation between universities and commercial enterprises.
Result: USDA established a task force involving participation of USDA, industry and academia to assess the development potential of a select number of new crops containing useful chemicals and products (about 1985-1986).

Result: USDA and Purdue University organized a conference on new crops to address research, development and economics, and to develop strategies for the establishment of cooperative partnerships between state, Federal, and industrial organizations (1988).

1983: ***Water-Related Technologies for Sustainable Agriculture in U.S. Arid/Semiarid Lands***

OTA: Increase research and monitoring of agricultural and health effects of contaminants in water.

Result: Increased research and monitoring especially of groundwater has occurred by the USDA, USGS, EPA, and land-grant universities. OTA, at the request of Congress, currently is conducting an assessment of agricultural technologies for minimizing the introduction of agrichemicals into groundwater.

1985: ***Technologies to Benefit Agriculture and Wildlife***

OTA: Congress could direct the USDA and USDI under Title XIV of the Farm Bill to cooperatively investigate and evaluate biological farming and other alternatives to conventional U.S. farming practices.

Result: (See result from ***Impacts of Technology on U.S.Cropland and Rangeland Productivity***)

1987: ***Technologies to Maintain Biological Diversity***

OTA: Direct the National Science Foundation (NSF) to establish a program for conservation biology.

Result: An increased number of conservation biology programs now exist in U.S. universities at least half of which are land-grant institutions. In addition, NSF in its 1990 budget request has identified conservation biology as a research area deserving increased emphasis and funding.

OTA: Direct A.I.D. to acquire increased conservation expertise in support of biological diversity initiatives.

Result: A.I.D. is in the process of hiring a senior-level scientist to direct A.I.D.'s overall approach to biological diversity including research activities.

These examples illustrate mixed results. In some cases, such as competitive grants, the research system was quick to respond. But in a number of areas, particularly related to investigating alternatives to present agricultural practices because of society's concern about the environment and the health and safety of consumers, the system has been slow to respond.

Priority Setting in Agricultural Research

Since the end of World War II, American Agriculture has made a transition from an industry based primarily on direct use of the natural resource base to one dominated by applications of science and technology to expand production from the resource base. During this period, rapid growth in production enabled the agricultural sector to strengthen its position in world markets.

The agricultural research community takes considerable pride in its contribution to this outstanding performance in agricultural production. But the certainty of assuring the necessary conditions to continue such performance in the future is being questioned. To maintain this record, sustained advances in science and technology are essential, the inherent productivity of the renewable resource base must be sustained, and major institutional changes may be necessary to sustain this process in an increasingly competitive world market.

To retain and enhance the food and agriculture base in an increasingly competitive world market requires long-term, high quality, thoughtful agricultural research. A critical factor in meeting this requirement is adequate resources. As we look to the closing decade of this century and beyond, it is evident that one of our greatest challenges is the restoration and maintenance of the vitality of our agricultural research system. A review of Federal support for agricultural research over the last two decades reveals that combined Federal and state funding has barely kept pace with inflation and that the historic Federal/state partnership is now being threatened by a lack of support at the Federal level.

Increases in Federal funds for agricultural research from 1978 to 1988 did not keep pace with inflation. Consequently, the "real" value of 1988 Federal support for agriculture research declined by 15 percent from 1978-1988. In recent years, states have had to provide an increasingly greater share of the cost of agricultural research. A period of economic recession in many states in the early 1980s and again possibly in the 1990s has reduced and could do so again their fiscal flexibility at a time when research should be expanding to meet the challenges that confront agriculture.

It is imperative that efforts be intensified to restore the balance of funding that has been so successful in developing the agricultural industry of the nation. We cannot remain competitive in the world of tomorrow without making the necessary investment in research today.

Private sector support for agricultural research has increased in real dollars especially for areas of biological research that can be patented. The focus of private sector research, however, is on applied and developmental research. Little private sector research is allocated to basic research. As a result, the public sector has shifted its focus to basic research. In so doing, important public sector applied research has diminished. A substantial portion of the remarkable gains in production achieved from the food and agricultural system have resulted from the fusion of basic and applied research. This fusion advanced both knowledge and technology. A critical question is how will this fusion take place in the future?

In such an environment the establishment of national research priorities, always an important activity, becomes critical. However, as Federal funds continue to decline in importance, the task of establishing and implementing national research priorities becomes much more difficult within the

Federal/State partnership. Quite naturally, as increased funding for agricultural research comes from the States, the land-grant universities are more inclined to direct research to that which the State feels is most important. In addition, many land-grant universities are entering into joint arrangements with the private sector to conduct research -- especially biotechnology research. This research may or may not match national research priorities.

The need for improved planning and priority setting of public research efforts certainly is not a new topic. The first attempt to coordinate Federal scientific activity occurred before 1920 in the national defense area with the creation of the Council for National Defense. Many national planning entities have been established since that time to improve coordination of Federal programs, including research programs.

Science coordination functions were given statutory authority in the National Science and Technology Policy, Organization, and Priorities Act of 1976, which attempted to establish a framework for planning and prioritization of Federal R&D activities. Efforts to prioritize agricultural research formally came from this Act which culminated in landmark legislation that became Title XIV of the 1977 Farm Bill.

Title XIV established two boards to provide recommendations on agricultural research needs and priorities: The Joint Council on Food and Agricultural Sciences (JC) and the National Agricultural Research and Extension Users Advisory Board (UAB). The Joint Council is to advise Congress on research needs and priorities from the perspective of the performers of the research. The Users Advisory Board is to do the same from the perspective of the user of the research.

The specific responsibilities of the Joint Council include a formidable list of tasks:

- evaluating research, extension, and teaching program impacts;
- identifying high-priority research;
- developing memoranda-of-understanding among the participants;
- establishing priorities;
- recommending responsibilities for research, extension, and teaching programs; and
- summarizing achievements.

In OTA reports that, in part, focused on the Joint Council we have expressed concern whether the functions assigned the Joint Council are attainable.

The Users Advisory Board has a somewhat less formidable task of determining needs and priorities for agricultural research and extension. Its major mandates include:

- reviewing USDA's policies, plans, and goals for research and extension;
- examining relationships between private and public sector research and extension programs;
- recommending policies, priorities, and strategies for research and extension; and
- assessing distribution of resources and allocation of funds for research and extension.

Prior to the establishment of the JC and UAB, much of the priority setting for agricultural research by administratively-established advisory committees had been laundry lists of research topics. Little, if any, real priority setting existed. Priority, as defined by Webster, is the quality or state of being prior; superiority in rank or position; or a preferential rating. The JC and UAB also have struggled with establishing priorities. Our view is that they are doing a much better job of priority setting today than when they were first established. But there is little, if any mention made particularly by the JC as to what the research community is willing to give up to attain the new priorities. Still, debate exists over whether plant science should receive more or less resources than animal science. Or whether crop science has a larger share of the budget than soil science. The focus instead should be on the problems facing American agriculture and the science and technology needed to provide solutions to these problems. Congress can help this process by articulating broad, consistent, measurable public policy goals for American agriculture.

This subcommittee will decide if the JC and UAB should be reauthorized in the 1990 Farm Bill. Congressman George Brown has suggested criteria on which to base the decision which we think seem appropriate.

First, does the JC and UAB provide a unique function? Are there other entities providing similar reviews and, if so, how do they differ from the JC and UAB?

Second, does the Joint Council and UAB provide sufficient advance planning, given the lag time in research activities? For example, when did the Joint Council first note critical environmental and food-safety research needs and did this occur far enough in advance to meet the current crisis that faces the food and agriculture sector in these areas?

Third, does the Joint Council have a sufficiently broad membership to integrate research needs and scientific advances coming from non-agricultural disciplines? For example, when did priority research and development needs in modern biological sciences or information sciences first appear in the Joint Council's recommendations and when did they appear in the priority listings in the general science and technology community?

Fourth, is the UAB membership representative of the users of agricultural research? There have at times been certain retired researchers and representatives of major private sector research firms on the UAB who would have been more appropriate as members of the Joint Council.

Fifth, and most important, what impact does the Joint Council and UAB have on the priorities set by the Department of Agriculture in its budget, or the priorities set by the Office of Management and Budget, or on the priorities reflected in Congressional appropriations?

There are, however, more actors than the JC and UAB in helping establish research priorities. Congress is besieged daily by the desires of their constituents. In agricultural research, this has resulted, for example, in a commodity group or a particular university receiving a higher priority for funding than some predetermined research policy thrust. The fact that most major commodity groups and many universities have Washington offices is not accidental. Such offices have proven to be very effective for these groups and, as a result, they can complicate the more formal research priority-setting process. It should be noted that a few universities have established a policy of not accepting research funds that are directly solicited from Congress.

Establishing research, extension, and teaching priorities is more essential today than ever before. With funding that has barely kept pace with inflation for the past 25 years, a society that is becoming more urban and less rural, and the political realities discussed above, priority setting can be a complex and frustrating process. In addition, there are new demands being placed on agriculture, spurred, for example, by environmental and food-safety concerns and the need to develop new crops and new uses of traditional crops.

Leadership by the scientific advisory groups is the key to success in research, extension and teaching priority setting. These groups must be able to articulate the scientific needs of agriculture clearly. A mandatory requirement for selection to these advisory groups should be a proven track record of providing a clear vision of the future, changing priorities to meet future scientific needs, and implementing programs to provide information and technology for the future. Such experience is needed if leadership in the agricultural sciences is to bring the agricultural sector together behind a bold, clear vision that will prepare us for the next century. Defending the status quo will not do the job.

The Joint Council and Users Advisory Board were created to provide this longer term view of agricultural research, extension and teaching activities. It is a difficult challenge given the constraints I have discussed. In our OTA study, we will make every attempt to provide options for Congress that will help ease the burden of meeting that challenge.

STATEMENT OF JOHN W. HARMAN, DIRECTOR, FOOD AND AGRICULTURE ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, U.S. GENERAL ACCOUNTING OFFICE

Mr. Chairman and Members of the Subcommittee, thank you for the invitation to appear before this Subcommittee to present information on our earlier reports on agricultural research activities. Although we have not had the opportunity in recent years to review programwide aspects of the U.S. Department of Agriculture's (USDA) agricultural research activities, we issued several reports in the early 1980s dealing with such subjects as long-range planning, personnel needs, use of research facilities, and funding.

We also have issued reports since 1980 on particular aspects of agricultural research, such as small farm research, human nutrition research, and biotechnology. Except for the biotechnology reports, which have been issued since 1985, these reports were also issued in the early 1980s.

As discussed with the Subcommittee, I will summarize our earlier programwide reports, discuss the recommendations we made at that time, and provide an update on actions that have been taken on the recommendations.

LONG-RANGE PLANNING

We reported in July 1981 that the U.S. agricultural research and development system did not perform national long-range planning that would meet generally accepted definitions of such planning.[1] Essentially, long-range planning entails establishing goals, selecting strategies for achieving those goals, setting priorities, and preparing short-range implementation plans.

We said that increasing demands for food and fiber combined with increasing pressures on agricultural inputs--water, land, and energy--made it all the more important that national long-range planning be undertaken for agricultural research and development. What has also become apparent is that the United States must find ways, including the development of new products and technologies, to improve the competitive position of its agricultural products in world markets.

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[1] Long-Range Planning Can Improve the Efficiency of Agricultural Research and Development (CED-81-141, July 24, 1981).

We pointed out that the key participants in the agricultural research system--USDA, the land-grant institutions, and the state agricultural experiment stations--had engaged in long-range planning to only a very limited extent; no rationale for long-range planning had been developed; and past planning efforts had not resulted in national, systemwide long-range plans. The planning efforts at that time dealt primarily with short-term or operational planning. The long-range planning that had occurred was done almost exclusively by USDA and focused on in-house research.

We pointed out that the states and USDA had worked together, coordinated research, and exchanged extensive amounts of information but that these efforts were independently managed and planned. Many individuals in the agricultural research and development system supported the concept of national long-range planning, but a number of factors inhibited such planning. Management and planning for individual research projects were split among federal, state, local, and private authorities; and this fact, plus frequent changes in departmental leadership, a lack of continuing congressional interest, and limited executive interest and guidance, made long-range planning extremely difficult.

We recommended, as we had in a 1977 report, that the Secretary of Agriculture develop an agencywide long-range plan for agricultural research and development.

In December 1981 the Congress amended the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (title XIV of the 1977 farm act) to state that long-range planning for research, extension, and teaching was a key element in meeting the act's objectives and that, accordingly, all the elements in the food and agricultural science and education system were encouraged to expand their planning and coordination efforts. The 1981 amendments also required the Secretary to take the initiative on overcoming barriers to long-range planning by (1) developing, in conjunction with the states, state cooperative institutions, the Joint Council on Food and Agricultural Sciences, the National Agricultural Research and Extension Users Advisory Board, and other appropriate institutions, a long-term needs assessment for foods, fiber, and forest products and (2) determining the research requirements necessary to meet those needs.

Following enactment of the amendments, USDA asked the Joint Council to direct the preparation of a long-term needs assessment, which was published and sent to the Congress in January 1984. In addition, USDA has developed long-range plans as the basis for future research management. In 1983, for example, it developed a plan consisting of a strategic plan, an implementation plan for the period 1984-90, and operational plans supporting the strategic plan. In September 1985 USDA published its second implementation plan, which covered the period 1986-92.

PERSONNEL NEEDS

In a December 1981 report,[2] we pointed out that USDA could do a better job in carrying out its responsibilities as the federal government's lead agency for keeping abreast of personnel needs in the food and agricultural sciences. We found that USDA's Office of Higher Education, which was created following the 1977 act, had worked with university representatives to identify issues and concerns related to the need for graduates in the food and agricultural sciences. However, it was not interacting with industry and federal agencies that also use such personnel. As a result, USDA was not obtaining a complete and up-to-date profile of the overall supply/demand picture and personnel development requirements for food and agricultural science personnel.

We recommended that the Secretary of Agriculture, through the Office of Higher Education, interact with a cross section of organizations, including government agencies, industry, and universities, that employ graduates trained in food and agriculturally related sciences.

USDA responded that the observations in the report would be useful in discharging its responsibilities and that it would be especially cognizant to obtain input from agricultural industry representatives as well as interact with other federal agencies in developing future assessments of food and agricultural science personnel needs.

In December 1985 the Congress amended the 1977 research, extension, and teaching policy act to add that the U.S. agricultural system requires a constant source of food and agricultural scientific expertise to maintain this dynamic system. The Congress also extended through September 30, 1990, the authorization for annual appropriations of $50 million for grants and fellowships for food and agricultural sciences education.

In discussing human capital development needs before the House appropriations subcommittee this year,

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[2] Lead Agency Responsibilities to Keep Informed of Personnel Needs in the Food and Agricultural Sciences (CED-82-25, Dec. 28, 1981).

USDA's former Assistant Secretary for Science and Education said that trends indicate a shortage of scientific and engineering personnel in the coming years and that many researchers in the federal and state system are at or near retirement age. He said that a broad need exists to strengthen the programs at the nation's colleges of agriculture and natural sciences, which produce scientists and other professionals with food and agricultural expertise.

In support of this need, USDA proposed two new programs: (1) a program of competitively awarded grants to build the capacity of the historically black 1890 land-grant institutions to recruit, train, and graduate high quality students and (2) a challenge grants program to fund the most meritorious proposals to revitalize curricula, encourage faculty development, support instrumentation, and improve student recruitment and retention in agriculture programs. Both programs would include a requirement for matching funds from nonfederal sources.

FEDERAL AGRICULTURAL RESEARCH FACILITIES

In a January 1983 report on federal agricultural research facilities,[3] we said that, despite the underuse of existing laboratories, new laboratories were under construction and others were being planned. We concluded that these additional facilities could further reduce the overall rate of use because the Agricultural Research Service's (ARS) personnel ceiling was not expected to rise in the foreseeable future. In addition, staffing of new laboratories might result in reduced staff at existing ones.

We said that to fully use its existing research facilities, ARS would require a substantial increase in its annual appropriations and higher personnel ceilings. We pointed out that ARS had closed some facilities and transferred staff to other locations to improve facility use and that, in response to an administration directive to identify low-priority activities for elimination, ARS had developed plans to close up to 12 research facilities.

We added that long-term planning and good justification for closures were necessary before research laboratories can be closed and that new facility construction or major expansion of existing space should be tied to long-range research goals and objectives.

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[3] Federal Agricultural Research Facilities Are Underused (GAO/RCED-83-20, Jan. 14, 1983).

We recommended that the Secretary develop a plan to consolidate agricultural research activities at fewer locations, thereby allowing greater scientist interaction and more efficient use of equipment, facilities, and administrative resources. We said that the plan also needed to address research priorities, personal and career plans of ARS employees, the costs of relocating employees, and the potential sales values of unneeded laboratories. We recommended that the Secretary submit the plan to the appropriate committees of the Congress for their review and comments.

We suggested that the Congress consider not authorizing or providing funds for additional research facilities until ARS had completed its planning process and the Congress had studied those plans given the existing underused research facilities, the unlikely prospects for personnel ceiling increases for ARS, and the congressional mandate to conduct a long-range needs assessment and to determine the research necessary to meet those needs.

ARS agreed that the report was correct with regard to space utilization. In developing its long-range plans, which I referred to earlier, ARS considered and included as part of its overall plans, laboratory needs, including suggested consolidations and closures.

More recently, the Chairman and other members of this Subcommittee, the full Committee, and the House Committee on Agriculture asked the Secretary for an overall assessment, in the research area, of USDA's infrastructure needs and plans for the future. They asked for specific information on research facilities and for the Secretary's view on the relative priority that should be placed on funding for new facility construction, older facility refurbishment, scientist and support salaries, and equipment purchases.

In response, the Secretary said that he would not apply a firm rule to setting priorities among these items. He said that, instead, he would expect the agencies to identify research program priorities, which would, in turn, form the basis for an assessment of available staff, equipment, and facility resources and the need for additional resources. According to the Secretary, facilities are available, in most cases, to conduct needed research and, in cases where high priority research is hampered by a lack of appropriate facilities, specific proposals would be considered through the budget process.

The Secretary also said that, as future budgets are developed, USDA would continue to carefully consider facility needs as they relate to priority research programs.

FEDERAL AGRICULTURAL RESEARCH FUNDING

In October 1983 we reported on issues and concerns regarding federal agricultural research funding.[4] We studied the regional distribution of the funds administered through USDA and obtained the views of state and federal research leaders on agricultural research funding issues.

We found that (1) both regional distribution of federal agricultural research funds and funding by the states varied widely depending on the specific research program and (2) interviews with officials at 14 land-grant institutions indicated that both federal formula and competitive grant funds for their research programs were favorably received, and any changes in formula allocation would generally be opposed. These officials generally supported increases in formula-derived funding to keep pace with inflation and in funding for the competitive grants program.

We did not make any recommendations in that 1983 report and, as I mentioned earlier, we have not had an opportunity to review the research funding area since then.

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That concludes my statement. I would be happy to respond to any questions you may have.

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[4] Federal Agricultural Research Funding: Issues and Concerns (GAO/RCED-84-20, Oct. 20, 1983).

STATEMENT OF ALICE N. PELL, ASSISTANT PROFESSOR, UNIVERSITY OF VERMONT

Mr. Chairman, members of the Committee, I appreciate the opportunity to discuss funding for agricultural research. As an Assistant Professor in Animal Sciences at the University of Vermont with an appointment which is 75% research, I am concerned about agricultural research funding both in terms of the total amount of money available and the balance of funds which can be obtained from the government and industrial sources. The examples which I cite below are from my research but are typical of those in other agricultural disciplines.

Currently, I am doing research in two very different areas. In one project, we are studying cellulose-digesting bacteria to increase understanding of the process by which fiber is broken down. Although we are working with bacteria from the rumen, this is an area which has applications in both human and animal nutrition, development of alternative sources of energy, and solid waste disposal. This project has been supported by Hatch funding and a grant from the EPSCoR program of the National Science Foundation. The second project which is funded by industry involves research to investigate the effects of bovine somatotropin, or growth hormone, on the health and productivity of lactating dairy cows.

When I was a graduate student, most agricultural researchers relied on Hatch formula funding for a significant portion of their financial support. Last year, I received $2000 in operating money from our experiment station. This amount covered only the cost of the maintenance contracts on our centrifuge and computer, and the costs to dispose of chemicals and radioactivity. Funds for equipment replacement have not been available. Last week, the thermostat on our 22 year old incubator which I had scavenged from the Medical School malfunctioned and most of our bacterial cultures were killed. Despite having taken precautions to protect against this type of misfortune, one of my graduate students lost about 4 months worth of work. My laboratory is located in a building which has not been renovated since its construction in the late 1940's. Electrical surges which wreak havoc with computers are common. We are working with a "hand-me-down" environmental chamber. Leaks in this oversized plastic bubble permit entrance of oxygen into the chamber which is fatal to our bacteria. Our research progress has been impeded because of the large amounts of time we have had to devote to repairing this chamber. The equipment and facilities available at the University of Vermont are typical of those found in most Colleges of Agriculture across the country.

The message conveyed by several years of level Hatch support is clear: the days of relying on formula funding are over and that procuring grants is a major responsibility for any scientist doing agricultural research today. Last year, I wrote seven major grant proposals to federal agencies, private foundations and industry. I probably spent more time seeking funds than actually doing science. Coordination among the different scientific funding organizations could minimize the amount of time a researcher has to devote to proposal preparation.

When seeking funds for the cellulose degradation project, I have received comments from reviewers indicating that my most likely source of funding is the U.S.D.A. competitive grants program. My problem is that for each of the last several years only one project in rumen microbiology, my research area, has been funded by the Animal Growth and Development section of the U.S.D.A. competitive grants program. It is unlikely that I will succeed in obtaining funds from the U.S.D.A. when I am in competition with people who have 10-15 years more experience than I do. The U.S.D.A. has no young investigator programs similar to those supported by the National Institutes of Health or the National Science Foundation.

Only about 10% of the new submissions to the U.S.D.A. competitive grants program are funded. The total amount of money earmarked for agricultural research is small in comparison to that allocated to the National Institutes of Health, the National Science Foundation or the Department of Energy, and the rate of increase in U.S.D.A. research funding has been much slower than that to the other granting agencies. The costs of doing research, particularly using either modern scientific techniques or large animals, have increased much faster than the research funds available.

To keep my research program going, two of the possible options are: 1)-- Shifting my research into the biomedical area where funding is more readily available, or 2) Obtaining industrial funding with the hope that I can save enough money to keep the cellulose degradation project going. The idea of switching into biomedical research is tempting, but I am always somewhat sad when I contemplate it. I chose the field of Animal Science because I was interested in working on problems related to agriculture and food production. I persevere in the belief that, in a world where the population is likely to double in the next twenty years and where serious problems must be addressed to ensure that adequate amounts of food are produced without causing irreparable harm to the environment, it should be possible to obtain adequate funding for agricultural research.

However, my other alternative, keeping a research program afloat with industrial funding, also has several disadvantages:

- Priorities are set by the needs of the industry commissioning the research, not by the researcher or by a thoughtful examination of what information is needed.

- In most cases, the industrial funding available is for applied research. Although needed information about the safety or efficacy of a product may be obtained, our understanding of the basic mechanisms involved is not increased.

- In the Animal Sciences, industrially funded product evaluation is often referred to as "Feed 'Em and Weigh 'Em" research and correctly does not impress review committees when faculty are being considered for tenure or promotion. However, industrial funding is one of the most available sources of money for young faculty who are less likely to get federal grants.

- The direction of research is determined by the availability of funding rather than on whether a significant scientific contribution is possible. This is not to argue that researchers should be allowed to address irrelevant questions indefinitely. However, the need for money drives researchers to take on projects which do not use their expertise effectively.

- The need to demonstrate significant progress to obtain renewal funding often means that scientists are conservative in their choice of research topics. They do not dare to tackle a difficult but significant problem because progress might be slow and they would lose their support.

- Projects which may be of great benefit to either farmers or consumers are not undertaken because funding is unavailable. For example, it is difficult to obtain funding for research on ways to increase use of locally grown forages or to study protein metabolism in ruminants.

The question which you as members of this committee are wrestling with is how to distribute the relatively small amount of federal money likely to be available for agricultural research to alleviate these problems. From my perspective, some Hatch funding should be retained to be used to restore and maintain the agricultural research infrastructure. Some changes in the distribution of these funds would ensure that faculty in large, well-funded universities do not have an insuperable advantage over those in other institutions. The remainder of the money should be put into competitive grants programs which have clearly defined objectives and priorities. A young investigator program which gives researchers initial funding to launch their research careers would be helpful. Coordination among the different federal agencies which support scientific research could decrease the amount of time which researchers devote to proposal preparation and possibly decrease the costs of administering the programs.

July 27, 1989

To: Ms Cynthia Neuwalder
From: Dr. Alice N. Pell
Re: Response to Written Questions Posed by Sen. Leahy for hearing on "The Mechanisms for Establishing Priorities in Agricultural Research Programs"

Enclosed are the responses to the two questions submitted to me by Senator Leahy to be included in the hearing record for the hearing held on June 20, 1989:

Question 1: In your years of research, has there been any indication that milk from BST-treated cows is, in any way, unsafe for human consumption? Could you briefly explain the science behind your answer in a plain-Jane way so that we may all understand?

Response: Prior to agreeing to do research on BST in 1986, I wanted to be very certain that milk safety was not a problem as the milk from our research was to be sold to students at the University of Vermont through the dairy bar and cafeterias. As a result, I independently looked into the existing research on milk safety before I undertook the research. This examination confirmed F.D.A.'s opinion that the milk does not pose health risks. Briefly, there were several arguments that convinced me of the safety of the milk.

1. BST is a protein hormone like insulin, not a steroid like the growth promotants used in the meat industry and illegally by some athletes. These two types of hormones have very different chemical structures and mechanisms of action. One of the most important differences is that protein hormones are not active orally. Before absorption into the bloodstream from the small intestine, they are broken down into small peptides and amino acids which are not biologically active. This is the fate of the BST found in milk. If this were not the case, both BST and insulin could be fed rather than injected. To make the life of diabetics easier, much research has been conducted to find a way to administer insulin orally but these efforts have not been successful to date. A number of different studies have been conducted with BST to ensure that biologically active forms of the hormone are not absorbed. The results of these studies indicate strongly that intact BST does not cross the intestinal wall even when administered at very high levels in normal animals.

2. BST is not active in humans because of species specificity. A series of experiments were run during the 1950's to determine whether administration of BST would remedy growth deficiencies in humans. BST isolated from the brains of cows sent to slaughter was administered both to normal volunteers as well as to patients with growth disorders. No adverse effects were detected even when the hormone was administered at high levels for several months. The scientific reason for this lack of activity is that the composition of the human and bovine variants of the hormone is so different that the bovine form cannot bind effectively to the human somatotropin receptor. The result is that if the bovine protein is injected in humans,

it will be cleared rapidly from the human blood stream by the liver without having a biological effect.

3. BST levels in milk from cows treated with somatotropin do not differ from the concentrations found in the milk of untreated animals. Low levels of BST are found in the milk of all cows (about 3-7 parts per billion). These levels do not change with BST treatment. One of the reasons why BST levels do not change in milk is because of the way in which BST works. It is made in the brain and is carried in the blood to the liver where it binds to a receptor. BST stimulates the synthesis of a second protein, IGF-1. IGF-1 is carried in the blood to the mammary gland where it binds and stimulates additional milk production. A reasonable question is whether IGF-1 levels are altered by BST treatment. The answer is that IGF-1 levels in the milk remain within the normal physiological range for cows. The IGF-1 levels found in cows' milk are significantly lower than those found in human milk.

4. Concern has been expressed both by members of the dairy industry as well as by some members of the public that the composition of milk may be changed by BST treatment. Milk composition does vary during the year depending on diet, stage of lactation and health of a cow. For example, the fat composition of milk from a cow which calved within a week is quite different from one which has been milking for several months. However, when properly controlled studies are conducted, changes in milk composition due to BST treatment are not evident.

   Whether BST treatment increases mastitis is a frequent concern. If incidence of mastitis did increase, it would have an adverse effect on milk composition and cheese yield from that milk. In both university research herds and in field trials, there is no evidence that the higher production levels stimulated by BST increase either somatic cell counts (the white blood cells which fight mastitis infections) or incidence of clinical mastitis.

   Although we do not have all of the data from our trials summarized, the data which we have analyzed, my general impression of the health of the animals on those studies and the results from other research trials do not suggest that the cows receiving BST treatment are highly stressed and therefore more susceptible to health problems.

Based on this evidence and the fact that in 1985 the F.D.A. approved the sale of milk and meat from research cows treated with BST for sale with no withdrawal time, members of the Animal Science department at the University of Vermont decided to proceed with the research. I can assure you that this decision would not have been made if we had felt that there were unresolved food safety issues.

Question 2: Do you believe that the Food and Drug Administration has been thorough in their evaluation of the human health concerns regarding BST-treated cows and the milk they produce?

Response: Because the research I have been conducting will be part of the data reviewed by the F.D.A. as they decide whether BST should receive commercial approval, I am familiar with their monitoring of research trials. They approve the research protocol before the trial begins to ensure that the research addresses relevant questions and that it is appropriately designed so that valid conclusions may be drawn from the data generated. My perception is that they have taken this responsibility seriously and that there is strict compliance with their demands by the companies involved. I know of instances in which trials were rerun and additional data requested because the F.D.A. was not satisfied with the research.

The F.D.A. also has responsibility for auditing the research trials either when they are in progress or after they are complete. These audits are unannounced so there is no opportunity for the researchers to conceal unacceptable practices. When our trial was audited last summer, the F.D.A. personnel were at the University of Vermont for three full days. During that time, they watched how we performed our daily routines such as milking and feeding the cows as well as checking that our data collection procedures were valid. They checked that our scales were routinely calibrated, that our feed was properly mixed and that the milk was mixed correctly before samples were taken for compositional analysis. The two F.D.A. inspectors involved had experience with both dairy animals as well as with the drug approval process. I was impressed with the thoroughness of their investigation.

One issue which has been raised by the press is whether the research conducted is unbiased because it has been funded by companies which have a stake in the outcome. There are three points which I would like to make to address this concern: 1) The companies which are likely to profit from such research should pay for it and the very limited amount of federal funding available for agricultural research should not be spent on this type of project, 2) the F.D.A. monitoring process is thorough enough so that fraud would be unearthed if it were occurring and 3) I can assure you that at the University of Vermont, our commitment is to conducting a valid research project so that if there are problems with this product, they are discovered prior to commercial approval and not at the expense of the dairy farmers of the state. I believe that this is the case at other universities where similar research is being conducted.

STATEMENT OF RALPH T. HAND, JR., PRESIDENT, DELTA COUNCIL

Mr. Chairman and members of the Subcommittee, my name is Ralph Hand and I am a cotton, soybean, and wheat producer from Tallahatchie County, Mississippi, and I appear before you today representing Delta Council, a producer organization that represents the interests and views of farmers in the 18 Delta and part-Delta county area, commonly known as the Mississippi Delta. In our region, we produce approximately 70% of our state's agricultural production, including the majority of the cotton, soybeans, and rice, and virtually all of the wheat and farm-raised catfish in the State of Mississippi.

We would like to express our enthusiastic support for Chairman Daschle and his Committee's pursuit of input regarding the research title of the 1990 Farm Bill, and we strongly encourage this Subcommittee to lead the Congress of the United States in revitalizing the high priority which should be placed on possibly the single most-important component which has accounted for American agricultural competitiveness in global markets --- superior and unsurpassed agricultural technology. Many skeptics or critics of our agricultural system in the U.S. might contend that American agriculture is competitive only because we have more high quality land and abundant water resources than other developed and even underdeveloped nations in the global marketplace; however, a study of this issue will readily reveal that this is not accurate --- in fact, the country of India has similar land and water resource characteristics but they have failed to even be self-sustaining in terms of their food and fiber needs. Others may explain the competitive position of U.S. agriculture by describing the U.S. farmer as a more resourceful, talented, or even more intelligent businessman than his counterparts in other nations, and certainly we hope that this is an accurate assessment; but, then we must ask for an explanation of the reasons why the average U.S. farmer-producer also outpaces the national production averages of similar farms in competing nations. Although our natural resource base is more fully developed than our competition in many instances and even though private entrepreneurship of our farming community should always be highlighted as being of key importance to the success of U.S. agriculture, it is undeniable that the ingredient of overriding importance to the historical position of U.S. agriculture in competitive global trade is largely attributable to our ability to obtain technological breakthroughs through public-supported agricultural research in our Land-Grant System and U.S.D.A.-Agricultural Research Service.

Mr. Chairman, with your permission I would like to display a chart which gives a very concise and sharp focus on the value which we place on agricultural research in our State of Mississippi. (Chart 1) This chart exhibits that for every federal, state, and local dollar invested in agricultural research in our region, we have validated through published research reports that the economy of our region receives $41 in return through additional economic productivity. This chart does not include the economic activity that is precipitated by the "blending and stirring" of existing inputs and production output of agriculture, but instead this chart only reflects new economic productivity, new financial resources, and an expanded local tax base to assist in the strengthening of rural America. Since 1935, when Delta Council was founded, we have emphasized at the federal and state level that American agricultural efficiency and productivity traditionally has a strong and tightly bound correlation to the economic health of rural America. Certainly, the ability of farmers to reduce costs and produce more units per acre through new agricultural technology cannot be the only course on the national agenda for strengthening the economic health of rural America. (Chart 2) However, in a recent publication for members of the Mississippi Congressional Delegation, we demonstrated an example of some very conservative and attainable goals within reach of the ongoing agricultural research in our State. As you can see, we could immediately produce an estimated $161 million of added economic growth to our small rural region which is tucked away in the corner of one state.

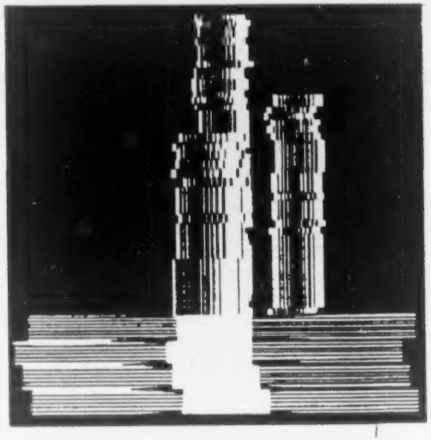
Mr. Chairman, we would like to stress that while many advocates of the value of agricultural research might express that a higher degree of emphasis be placed on biological sciences or basic research in the 1990 Farm Bill, there will be many others who will contend that the more applied research objectives for high-yielding seed varieties, disease control research, insect control research, and weed sciences must remain the top priorities for any federal role in research. In recent years, quite a bit of posturing has even occurred among the scientific community about the scope and mission of federal agricultural research dollars, as it pertains to the investment in state supported Land-Grant Institutions and even the U.S.D.A.-Agricultural Research Service. We support sustained study and refinement of all approaches to agricultural research; but, it would be reprehensible and cause almost irreversible damage if we allow these studies to translate into a trend that could possibly diminish the federal role in agricultural research. The message which Delta Council would like to leave with members of this Committee is that we must renew the federal commitment to agricultural research if we are expected as a society to continue to rely upon a national policy of dependable and inexpensive food and fiber, a favorable agricultural trade balance, and a stable economy in rural America. In recent years, the Congress has restored funding for essential agricultural research initiatives after they have been eliminated from the Executive Budget. (Chart 3) However, even with the strong advocacy of the Authorization and Appropriations Committees on behalf of agricultural research, there has been a significant erosion of resources allocated to agricultural research. We would like to conclude by urgently requesting that this Committee provide the leadership through the research title of the Agricultural Act of 1990 to outline specific levels of increased funding that reflect a renewed commitment to the Agricultural Research Service of U.S.D.A. and our Land-Grant Institutions. The harshest penalty which could be forced on rural America in the future would be for us to continue to allow a constant, and consequently shrinking part of our federal resources to be allocated toward technology development which offers a proven and demonstrated record for U.S. agricultural superiority in terms of global competition.

The friends of agriculture who serve in the Congress have utilized virtually every method available under the current budget constraints to salvage and maintain only the most essential parts of the federal presence in agricultural research. All forms of research are admittedly high-risk and long-term, and therefore when we reduce our support to the limits of our existing programs, we are actually abandoning many of those opportunities which innovative and expanding research can often unveil for agricultural productivity.

We respectfully reiterate our support for this Committee's efforts to design language into the Agricultural Act of 1990 which directs that increased levels of funding be allocated for agricultural research. Mr. Chairman, thank you for allowing us to appear before you today.

Chart 1

Benefits of Agricultural Research to Mississippi's Economy



$1 in research = $41 in benefits

Source: Independent Study by Virginia Tech University

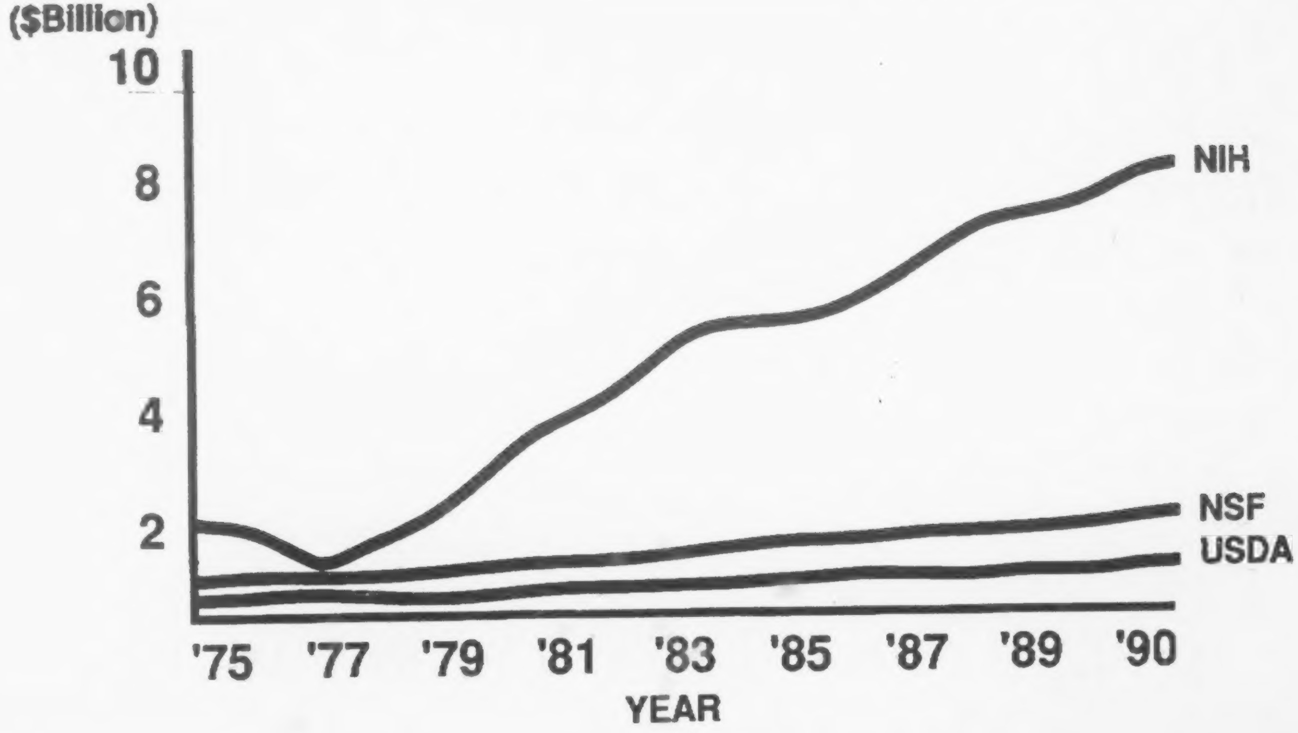
Chart 2

Economic Impact of Increased Yield
Mississippi Delta

Commodity	1985-1987 average harvested acres	Yield increase per acre	1985-1987 avg. price received	Value of increased production
Cotton	1,016,667	50 pounds	.564	$ 31,119,742
Soybeans	2,506,667	5 bushels	5.30	66,464,572
Rice	194,667	10 bushels	6.26	12,178,765
Catfish	75,800	1,000 pounds	.686	51,998,800
Total value of increased production				$161,761,879

CHART 3

R&D BUDGETS



FOLLOWUP QUESTIONS TO DR. CHARLES E. HESS FROM SENATOR DASCHLE FOR JUNE 20, RESEARCH HEARING

1. There is a growing interest on the part of Congress, and this committee, to address the issue of food safety. Since the Department of Agriculture has the responsibility to inspect this Nation's meat, poultry and egg supply, could you detail for the committee what will be the research priorities for the Agricultural Research Service (ARS) and the Cooperative State Research Service (CSRS) in that regard? Would you supply for the record what percentage of your total budget is devoted to this issue?

2. Will you provide for the committee a list of research projects currently underway both in ARS and in the CSRS that address meat, poultry, and fish safety issues?

3. Since ARS and CSRS are the only two scientific research arms of the Department of Agriculture, will you detail for the committee how other agencies within the Department get their top research needs addressed? Please outline the process within the Department for prioritizing research projects based on the needs identified by individual agencies within the Department?

4. Please provide the committee with a list of the projects that you anticipate to fund in FY 1990 to address the needs of the Food Safety and Inspection Service (FSIS) specifically?

RESPONSES PROVIDED FOR THE RECORD FROM DR. CHARLES E. HESS, ASSISTANT SECRETARY FOR SCIENCE AND EDUCATION, U.S. DEPARTMENT OF AGRICULTURE

Question 1. There is a growing interest on the part of Congress, and this committee, to address the issue of food safety. Since the Department of Agriculture has the responsibility to inspect this Nation's meat, poultry and egg supply, could you detail for the committee what will be the research priorities for the Agricultural Research Service (ARS) and the Cooperative State Research Service (CSRS) in that regard? Would you supply for the record what percentage of your total budget is devoted to this issue?

Answer.

RESEARCH PRIORITIES

To develop methodology to identify and detect chemical residues (drug, pesticide or fungal origin) of concern in meat and poultry and their products.

To develop methodology to detect and control bacterial and parasitic contamination of meat and poultry and their products.

Specifically this research seeks to:

—Control *Salmonella* and *Campylobacter* in live animals.

—Control fecal and bacterial contamination, in particular, *Salmonella* in slaughtering and processing of meat animals and poultry.

—Control hazardous bacteria, e.g., *Listeria, Yersinia, Clostridum, Salmonella,* etc., in food systems, e.g., fresh and processed meat and poultry products.

—Detect drugs and pesticides in meat and poultry.

—Develop pharmacokinetic models of drug metabolism in food animals.

—Control parasites, i.e., trichinosis, toxoplasmosis, cysticercosis, which result in food safety problems in cattle and swine.

FUNDING

Approximately 5 percent of the Agricultural Research Service's Budget is devoted to Food Safety Research. Approximately 2 percent of the Cooperative State Research Service's Budget is devoted to Food Safety Research.

Question 2. Will you provide for the committee a list of research projects currently underway both in ARS and in CSRS that address meat, poultry, and fish safety issues?

Answer.

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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- USDA RESEARCH

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION

ARS  1935  1935-42000-012-01S    TUCSON FARMS              ALABAMA A & M UNIVERSITY
  0142862    RAO  D R              01 07 88   31 12 89   NORMAL                 ALA
 SURVIVAL OF SALMONELLA/NUTRIENT CONTENT OF CHICKEN EXPOSED TO VARIOUS DOSES OF
 IONIZING RADIATION

ARS  5325  5325-42000-001-01S    NATIONAL FOOD PROCESS  6363 CLARK AVENUE
  0049651    KING  A D             25 09 84   30 09 87   DUBLIN                 CAL
 HEAT RESISTANCE OF C BOTULINUM SPORES IN MEAT

ARS  5325  5325-42000-009-000                              WESTERN REGIONAL RES CEN
  0144157    VACANT                06 01 89   30 09 90   ALBANY                 CAL
 DETECTION OF EXTRANEOUS HAZARDOUS MATERIALS IN FOODS

ARS  5325  5325-42000-010-000                              WESTERN REGIONAL RES CEN
  0144300    BINDER  R G           20 01 89   30 01 90   ALBANY                 CAL
 RAPID, CHEMICAL & IMMUNOCHEMICAL ASSAYS FOR MONITORING DRUG & PESTICIDE
 RESIDUES IN FOOD

ARS  5325  5325-42000-012-000                              WESTERN REGIONAL RES CEN
  0143575    TBD                   01 10 89   31 03 90   ALBANY                 CAL
 PREVENTION OF FORMATION OF BOTULINUM TOXIN IN PARTIALLY STERILIZED FOO D
 PRODUCTS

ERS  CED   CED-FPR-4332          ECONOMIC RESEARCH SER  1301 NEW YORK AVENUE NW
  0120317    SMALLWOOD  D          01 10 88   30 09 99   WASHINGTON              DC
 ECONOMICS OF FOOD POLICY, REGULATIONS, SAFETY, AND ASSISTANCE PROGRAMS

ARS  6612  4001-21020-001-07R    MEAT SCIENCE RESEARCH  AGRICULTURAL RESEARCH SE
  0140078    STERN  N J            01 10 84   30 09 87   ATHENS                  GA
 DETECTION AND CONTROL OF CAMPYLOBACTER JEJUNI IN POULTRY AND RED MEATS

ARS  6612  6612-20841-006-000                              AGRICULTURAL RESEARCH SE
  0049279    CRAVEN  S E           01 05 84   01 05 87   ATHENS                  GA
 MECHANISM(S) OF ACTIVATION & INJURY OF CLOSTRIDIUM PERFRINGENS SPORES BY
 PHYSICAL/CHEMICAL AGENTS

ARS  6612  6612-20842-007-000                              AGRICULTURAL RESEARCH SE
  0047938    LILLARD  H S          16 12 82   16 12 87   ATHENS                  GA
 ATTACHMENT OF HARMFUL BACTERIA TO SURFACES OF MEAT AND EQUIPMENT DURING POULTRY
 PROCESSING

ARS  6612  6612-42000-001-000                              AGRICULTURAL RESEARCH SE
  0141724    DAVIS  C E            10 07 86   09 07 91   ATHENS                  GA
 UNIQUE BIOCHEMICAL AND PHYSICAL METHODS TO DETERMINE END-POINT TEMPERATURE OF
 MEAT PRODUCTS

ARS  6612  6612-42000-002-000    POULTRY MEAT QUALITY   AGRICULTURAL RESEARCH SE
  0049507    BAILEY  J S           01 10 85   30 09 90   ATHENS                  GA
 CONTROL OF SALMONELLA IN POULTRY

ARS  6612  6612-42000-002-02T                              AGRICULTURAL RESEARCH SE
  0142706    COX  N A              01 07 88   30 09 89   ATHENS                  GA
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- USDA RESEARCH

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                     PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE    TERM DTE    LOCATION

 AN ARD A SALMONELLA VACCINE TO REDUCE THE RESERVOIR OF SALMONELLA IN POULTRY

ARS  6612  6612-42000-002-08T                               AGRICULTURAL RESEARCH SE
  0143113    BAILEY  J S             01 07 88   30 06 89   ATHENS                GA
 EFFECT OF NEOSUGAR ON PREVENTION OF COLONIZATION OF CHICKEN INTESTINES BY HUMAN
 ENTEROPATHOGENS

ARS  6612  6612-42000-003-000    POULTRY MEAT QUALITY   AGRICULTURAL RESEARCH SE
  0049505    SHACKELFORD  A D        01 10 85   30 09 90   ATHENS                GA
 IMPROVE THE MICROBIOLOGICAL SAFETY OF PROCESSED POULTRY

ARS  6612  6612-42000-007-000                               AGRICULTURAL RESEARCH SE
  0144142    BAILEY  J S             20 01 89   19 01 91   ATHENS                GA
 MICROBIOLOGICAL SAFETY OF LIVE AND REPROCESSED BROILERS

ARS  6612  6612-42000-008-000                               AGRICULTURAL RESEARCH SE
  0144587    MCHAN  F                14 02 89   14 02 92   ATHENS                GA
 ATTACHMENT OF SALMONELLA AND OTHER PATHOGENS IN THE DIGESTIVE TRACT OF POULTRY

ARS  6612  6612-42000-009-000                               AGRICULTURAL RESEARCH SE
  0144588    LILLARD  H S            01 10 85   30 09 90   ATHENS                GA
 ATTACHMENT OF HARMFUL BACTERIA TO SURFACES OF MEAT AND EQUIPMENT DURING POULTRY
 PROCESSING

ARS  6612  6612-42000-010-000                               AGRICULTURAL RESEARCH SE
  0144582    MEINERSMANN  R E        14 02 89   13 02 94   ATHENS                GA
 CONTROL OF CAMPYLOBACTER IN POULTRY

ARS  6612  6612-42000-010-01T                               AGRICULTURAL RESEARCH SE
  0142870    MEINERSMANN  R J        01 10 88   30 09 91   ATHENS                GA
 COLONIZATION FACTORS EXPRESSED BY CAMPYLOBACTER JEJUNI IN THE CHICKEN

ARS  6612  6612-42000-010-02S    MEDICAL MICROBIOLOGY   UNIVERSITY OF GEORGIA
  0141143    GRATZEK  J B            01 03 86   01 03 91   ATHENS                GA
 DETECTION AND CONTROL OF CAMPYLOBACTER IN POULTRY

ARS  6612  6612-42000-011-000                               AGRICULTURAL RESEARCH SE
  0144769    LILLARD  H S            01 10 90   31 12 90   ATHENS                GA
 PREVENT THE ATTACHMENT OF FOODBORNE PATHOGENS TO POULTRY SURFACES DURING S
 LAUGHTER AND PROCESSING

ARS  3620  3620-42000-007-000                               NORTHERN REGIONAL RES CE
  0144109    BAGLEY  E B             20 01 89   19 01 94   PEORIA               ILL
 SUPERCRITICAL FLUID EXTRACTION AND ANALYSIS OF TOXICANTS IN FOODS

OICD 1935  8001-42430-342-00P                               ANDHRA PRADESH AGRIC UNI
  0142167    REDDY  G R K            17 06 87   17 06 90   HYDERABAD             IN
 ROLE OF LACTIC ACID BACTERIA IN IMPROVING THE MICROBIAL QUALITY OF MEAT AND
 MEAT PRODUCTS
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990         CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- USDA RESEARCH

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                 PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE    LOCATION

ARS  1220  1206-20320-002-000    MEAT SCIENCE RESEARCH  BELTSVILLE AGR RES CENTE
  0049685    MOATS  W A            30 03 85   30 03 87   BELTSVILLE            MD
 PHYSICAL-CHEMICAL METHODS FOR DETERMINING ANTIBIOTIC RESIDUES IN ANIMAL

ARS  1220  1206-20842-002-000    MEAT SCIENCE RESEARCH  BELTSVILLE AGR RES CENTE
  0047880    STERN  N J            01 09 82   01 09 86   BELTSVILLE            MD
 DETECTION AND CONTROL OF CAMPYLOBACTERS AND OTHER FOODBORNE PATHOGENIC
 MICROORGANISMS ON MEAT

ARS  1220  1206-20842-002-01S    MICROBIOLOGY            UNIV OF MARYLAND
  0048178    STERN  N J            15 01 83   14 01 87   COLLEGE PARK          MD
 A MOUSE MODEL FOR DETECTING PATHOGENIC CAMPYLOBACTER JEJUNI

ARS  1270  1270-24000-001-000
                                                         BELTSVILLE AGR RES CENTE
  0141351    MILLS  F D            11 03 87   30 09 89   BELTSVILLE            MD
 FATE AND IDENTITY OF TERMINAL PESTICIDE RESIDUES IN FOOD, SOIL, AND GROUNDWATER

ARS  1270  1270-42000-002-000
                                                         BELTSVILLE AGR RES CENTE
  0144309    ARGAUER  R J          28 11 89   27 11 92   BELTSVILLE            MD
 MULTIRESIDUE METHODS FOR PESTICIDES IN MEAT AND MEAT PRODUCTS

ARS  1280  1280-42000-001-000
                                                         BELTSVILLE AGR RES CENTE
  0141923    MOATS  W A            01 11 86   24 09 87   BELTSVILLE            MD
 PHYSICAL-CHEMICAL METHODS FOR DETERMINING ANTIBIOTIC RESIDUES IN ANIMALS

ARS  1280  1280-42000-002-000
                                                         BELTSVILLE AGR RES CENTE
  0142010    MOATS  W A            04 01 87   31 03 90   BELTSVILLE            MD
 PHYSICAL-CHEMICAL METHODS FOR DETERMINING ANTIBIOTIC RESIDUES IN TISSUES AND
 MILK

ARS  0500  0500-21010-011-17G    ENVIRONMENTAL TOXICOL  MICHIGAN STATE UNIV
  0142082    GRAY  J I             01 06 87   31 12 88   EAST LANSING         MIC
 INFLUENCE OF WOOD SMOKE ON FORMATION OF N-NITROSO COMPOUNDS

ARS  0500  0500-21010-011-18G    ENVIRONMENTAL TOXICOL  MICHIGAN STATE UNIV
  0142252    FISCHER  L J          01 06 87   30 11 88   EAST LANSING         MIC
 EFFECTS OF COOKING ON SULFAMETHAZINE RESIDUES IN PORK

ARS  0500  0500-21010-011-20G    ENVIRONMENTAL TOXICOL  MICHIGAN STATE UNIV
  0142254    ALLISON  J            01 06 87   31 05 88   EAST LANSING         MIC
 DEVELOPMENT OF A NEW TECHNIQUE FOR MASS SPECTROMETRIC ANALYSIS

ARS  3622  3622-42000-001-000
                                                         AGRICULTURAL RESEARCH SE
  0141268    ANDERSON  M E         01 04 86   31 03 91   COLUMBIA              MO
 CLEANING AND SANITIZING OF MEAT AND MEAT CONTACT SURFACES FOR ELIMINATION OF
 PATHOGENS

ARS  5442  5442-34420-001-000
                                                         AGRICULTURAL RESEARCH SE
  0143074    FEIL  V J             16 06 88   15 06 91   FARGO                 ND
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- USDA RESEARCH

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                 PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR           START DTE    TERM DTE    LOCATION

 ANIMAL DISPOSITION OF AMINOCYCLITOL ANTIBIOTICS

ARS  5442  5442-34420-002-000                               AGRICULTURAL RESEARCH SE
  0144017     FEIL  V J              03 01 89    02 01 92    FARGO                ND
 DISPOSITION OF SULFONAMIDE DRUGS BY FARM ANIMALS

ARS  5438  5438-42000-001-000                               AGRICULTURAL RESEARCH SE
  0140941     VACANCY                01 04 86    31 03 91    CLAY CENTER         NEB
 CONTROL OF FOODBORNE PATHOGENS IN RED MEAT

ARS  1935  1935-42000-004-03G                               CORNELL UNIVERSITY
  0141665     SCHWARTZ  D P          30 09 86    28 02 89    ITHACA               NY
 ANALYTICAL METHODS FOR DETERMINING ANABOLIC AGENTS IN BOVINE LIVER TISSUE

ARS  1935  1935-42000-001-000    EASTERN REGIONAL RESE    EASTERN REGIONAL RES CEN
  0048511     THAYER  D W            16 08 83    16 08 88    WYNDMOOR             PA
 LOW-DOSE IONIZING IRRADIATION OF MEATS AND POULTRY

ARS  1935  1935-42000-003-000                               EASTERN REGIONAL RES CEN
  0141412     PENSABENE  J W         01 05 86    30 04 91    WYNDMOOR             PA
 ELIMINATION OF PROCESSING GENERATED CONTAMINANTS IN FOODS

ARS  1935  1935-42000-004-000                               EASTERN REGIONAL RES CEN
  0141463     PARKS  O W             04 04 86    03 04 91    WYNDMOOR             PA
 DETERMINATION OF DRUG RESIDUES IN EDIBLE MEAT TISSUE

ARS  1935  1935-42000-004-02R                               EASTERN REGIONAL RES CEN
  0141636     HENION  J D            30 09 86    30 09 87    WYNDMOOR             PA
 ANALYTICAL METHODS FOR DETERMINING ANABOLIC AGENTS IN BOVINE LIVER TISSUE

ARS  1935  1935-42000-006-000    EASTERN REGIONAL RESE    EASTERN REGIONAL RES CEN
  0047753     SMITH  J L             07 07 82    07 07 87    WYNDMOOR             PA
 INTERACTION OF SALT & OTHER PROCESSING PARAMETERS ON TOXIGENICITY OF FOOD
 POISONING BACTERIA

ARS  1935  1935-42000-007-000                               EASTERN REGIONAL RES CEN
  0141891     ZAIKA  L L             01 02 87    31 01 92    WYNDMOOR             PA
 DETECTION AND CONTROL OF LISTERIA MONOCYTOGENES AND OTHER PSYCHROTROPHIC
 PATHOGENS

ARS  1935  1935-42000-008-000                               EASTERN REGIONAL RES CEN
  0141933     WHITING  R C           30 04 87    29 04 92    WYNDMOOR             PA
 IMPACT OF CHANGING TECHNOLOGIES ON CLOSTRIDIUM BOTULINUM AND OTHER ANAEROBIC
 FOODBORNE PATHOGENS

ARS  1935  1935-42000-009-000                               EASTERN REGIONAL RES CEN
  0142188     ZAIKA  L L             19 08 87    18 08 92    WYNDMOOR             PA
 INTEGRATED APPROACH TO CONTROL AEROBIC PATHOGENS WHILE REDUCING FOOD
 PRESERVATIVES/PROCESSING
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- USDA RESEARCH

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                  PERFORMING ORGANIZATION
  ACC NO.     INVESTIGATOR         START DTE    TERM DTE      LOCATION


ARS  1935  1935-42000-010-000                               EASTERN REGIONAL RES CEN
  0142193     SMITH  J L             01 10 87    30 09 90    WYNDMOOR              PA
 BIOREGULATORY APPROACHES TO CONTROLLING ENTEROPATHOGENIC FOODBORNE PATHOGENS

ARS  1935  1935-42000-012-000                               EASTERN REGIONAL RES CEN
  0142882     FOX  J B         .     12 10 88    11 10 91    WYNDMOOR              PA
 OPTIMIZATION OF PATHOGEN CONTROL AND VITAMIN RETENTION IN IRRADIATED MEATS AND
 POULTRY

ARS  1935  1935-42000-013-000                               EASTERN REGIONAL RES CEN
  0144232     BARFORD  R A           13 01 89    12 01 92    WYNDMOOR              PA
 ON-SITE DETECTION OF VETERINARY DRUG RESIDUES IN FLUIDS OF FOOD PRODUCING
 ANIMALS

OICD 6512  8003-42000-377-00P                               VETERINARY RESEARCH INST
  0142613     WOJTON  B              01 09 87    31 08 90    PULAWY                PL
 CONTAMIN. OF POUL. CARCASSES WITH CAMPYLOBACTER JEJUNI AND POSSIBILITIES OF
 THEIR CONTAMINATION

ARS  1280  1280-41520-001-01S    ANIMAL SCIENCE             TEXAS A&M UNIV
  0142389     CROSS  R               01 07 87    31 03 89    COLLEGE STATION      TEX
 LACTATE DEHYDROGENASE AS AN INDEX OF HEAT ENDPOINT

ARS  6202  6202-42000-002-000                               AGRICULTURAL RESEARCH SE
  0142588     ZIPRIN  R L            01 11 87    30 09 92    COLLEGE STATION      TEX
 DEVELOP COST EFFECTIVE MEANS TO PREVENT AND/OR CONTROL SALMONELLOSIS IN POULTRY
 AND BEEF CATTLE

ARS  6202  6202-42000-003-01R                               AGRICULTURAL RESEARCH SE
  0142818     MADSON  L              01 03 88    30 09 89    COLLEGE STATION      TEX
 INCURRED RESIDUES IN LIVESTOCK AND POULTRY
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT             PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION

CSRS AL.X  AL.X-HN-2             CARVER RES FOUNDATION  TUSKEGEE UNIVERSITY
 0091212     CHUNG  R A            01 10 83  30 09 90    TUSKEGEE           ALA
 FOOD QUALITY AND SAFETY OF MEAT, MILK AND EGG FROM ANIMALS RAISED BY
 LIMITED-RESOURCE FARMERS.

CSRS ALA   ALA-50-0078           POULTRY SCIENCE        AUBURN UNIVERSITY
 0150635     MORLEY  S D           15 09 89  30 09 91    AUBURN             ALA
 EVALUATION OF N-HALAMINES FOR USE AS DISINFECTANTS FOR THE CONTROL OF
 SALMONELLA

CSRS ALA   ALA00581              ANIMAL & DAIRY SCIENC  AUBURN UNIVERSITY
 0088580     HUFFMAN  D L          13 10 82  30 09 87    AUBURN             ALA
 EVALUATION OF PROCESS PARAMETERS & USE OF SELECTED ADDITIVES TO IMPROVE QUALITY
 OF RESTRUCTURED MEAT

CSRS ALA   ALA00671              ANIMAL & DAIRY SCIENC  AUBURN UNIVERSITY
 0097463     MCCASKEY  T A         20 11 85  30 09 90    AUBURN             ALA
 PATHOGEN SURVIVAL AND NITROGEN SOLUBILITY OF PROCESSED POULTRY MANURE AS A FEED
 INGREDIENT

CSRS ALA   ALA00704              POULTRY SCIENCE        AUBURN UNIVERSITY
 0130672     BILGILI  S F          01 01 87  30 09 91    AUBURN             ALA
 FACTORS AFFECTING THE PROCESSING EFFICIENCY, CARCASS CONTAMINATION AND YIELD OF
 BROILERS

CSRS ALAX  ALAX-012-187          FOOD SCIENCE & ANIMAL  ALABAMA A & M UNIVERSITY
 0130638     SIKES  A              01 12 86  30 09 90    NORMAL             ALA
 SHELF LIFE EXTENSION OF FRESH MEATS BY INOCULATING WITH BACTERIAL STARTER
 CULTURES

OCI  ALAX  ALAX-2-238-14-3110    FOOD SCIENCE & ANIMAL  ALABAMA A & M UNIVERSITY
 0151568     CHAWAN  C B           01 07 87  30 12 90    NORMAL             ALA
 RESEARCH AND TEACHING IN POULTRY MEAT PROCESSING USING THE APPLICATION OF
 IRRADIATION TECHNOLOGY

CSRS ARK   ARK01281              ANIMAL SCIENCE         UNIV OF ARKANSAS
 0131198     IZAT  A L             01 10 86  30 09 91    FAYETTEVILLE       ARK
 DEVELOPMENT OF NEW PROCESSES AND TECHNOLOGIES FOR THE PROCESSING OF POULTRY
 PRODUCTS

CSRS ARK   ARK01363              MEDICAL SCIENCES       UNIV OF ARKANSAS
 0138609     DANIELS  L B          15 06 89  15 06 91    FAYETTEVILLE       ARK
 EVALUATING THE SAFETY OF POULTRY AND POULTRY PRODUCTS FOR HUMAN CONSUMPTION

CSRS ARZT  ARZT-136181-H-23-007  NUTRITION & FOOD SCIE  COL OF AGR UNIVERSITY OF
 0135253     PARK  D L             21 07 88  30 09 91    TUCSON             ARZ
 DETERMINATION OF TOXIC/MUTAGENIC POTENTIALS OF FUNGAL, ALGAL, AND PLANT TOXINS
 IN FOODS & FEEDS

CSRS CALB  CA-B*-NTS-3991-RR     NUTRITIONAL SCIENCES   UNIV OF CALIFORNIA
 0083077     BJELDANES  L F        01 10 87  30 09 92    BERKELEY           CAL
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                 PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION

 IMPROVE FOOD SAFETY THROUGH DISCOVERY AND CONTROL OF NATURAL AND INDUCED
 TOXICANTS

CSRS CALB  CA-D*-ETX-2813-RR      ENVIRONMENTAL TOXICOL  UNIV OF CALIFORNIA
  0062506    HSIEH  D P H            01 10 87   30 09 92   DAVIS                 CAL
 IMPROVE FOOD SAFETY THROUGH DISCOVERY AND CONTROL OF NATURAL AND INDUCED
 TOXICANTS

CSRS CALB  CA-D*-ETX-3739-AH      ENVIRONMENTAL TOXICOL  UNIV OF CALIFORNIA
  0078662    BYARD  J L              10 05 82   30 09 88   DAVIS                 CAL
 NATURE, OCCURRENCE & EFFECTS OF TOXIC CHEMICALS IN ANIMALS

CSRS CALB  CA-D*-ETX-3926-H       ENVIRONMENTAL TOXICOL  UNIV OF CALIFORNIA
  0081262    SHIBAMOTO  T            25 04 90   30 09 94   DAVIS                 CAL
 ISOLATION AND IDENTIFICATION OF MUTAGENS AND CARCINOGENS IN FOODS

CSRS CALB  CA-D*-FST-3022-H       FOOD SCIENCE & TECHNO  UNIV OF CALIFORNIA
  0066194    MERSON  R L             01 10 86   30 09 90   DAVIS                 CAL
 THERMAL PROCESSING OF FOODS

CSRS CALB  CA-V*-EPM-4293-H       EPIDEMIOLOGY & PREVEN  UNIV OF CALIFORNIA (VET-
  0089350    GENIGEORGIS  C          04 02 83   31 12 87   DAVIS                 CAL
 STUDIES ON CAMPYLOBACTER JEJUNI AS A ZOOMATIC AGENT

CSRS CALB  CA-V*-EPM-4404-H       EPIDEMIOLOGY & PREVEN  UNIV OF CALIFORNIA (VET-
  0092266    GENIGEORGIS  C          31 01 84   31 12 87   DAVIS                 CAL
 GROWTH AND TOXIN PRODUCTION OF CLOSTRIDIUM(UNDERLINED) BOTULINUM(UNDERLINED) AT
 LOW TEMPERATURES

SBIR CALK  CALK-8900105           IDETEK INC             1057 SNEATH LANE
  0034469    RAM  B P                01 06 89   30 11 89   SAN BRUNO             CAL
 ENZYME IMMUNOASSAY FOR SCREENING OF SULFONAMIDES

CSRS CALV  CALV-AH-107            DEAN'S OFFICE          UNIV OF CALIFORNIA (VET-
  0134581    OSBURN  B I             20 04 88   19 04 93   DAVIS                 CAL
 FOOD SAFETY AND ANIMAL HEALTH

CSVM CALV  CALV-VM-202            EPIDEMIOLOGY & PREVEN  UNIV OF CALIFORNIA
  0083755    GENIGEORGIS  C          01 10 80   30 09 86   DAVIS                 CAL
 STUDIES ON THE ECOLOGY, EPIDEMIOLOGY AND PATHOGENESIS OF CAMPYLOBACTER FETUS
 ENTERITIS

CSRS COL   COL00740               ANIMAL SCIENCE         COLORADO STATE UNIV
  0083098    SOFOS  J N              01 07 90   30 06 94   FORT COLLINS          COL
 IMPROVING THE SAFETY, SHELF-LIFE AND QUALITY OF MEAT AND MEAT PRODUCTS

CSRS CONH  CONH00116              ANALYTICAL CHEMISTRY   P O BOX 1106
  0130527    AGARWAL  V K            01 12 86   30 09 89   NEW HAVEN             CON
 DETERMINATION OF AMINOGLYCOSIDE ANTIBIOTIC RESIDUES IN EDIBLE ANIMAL TISSUES
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT               PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION


CSRS CONH  CONH00121             ANALYTICAL CHEMISTRY   P O BOX 1106
  0139351    ARARWAL  V K           01 10 89   30 09 92   NEW HAVEN             CON
 MULTIRESIDUE ANALYSIS OF AMINOGLYCOSIDE ANTIBIOTICS IN MEAT, POULTRY AND MILK

CSRS CONS  CONS00607             AGRI ECONOMICS & RURA  UNIV OF CONNECTICUT
  0131585    COTTERILL  R W         01 01 87   30 09 91   STORRS                CON
 PRIVATE STRATEGIES, PUBLIC POLICIES, AND FOOD SYSTEM PERFORMANCE

CSRS CONS  CONS00620             AGRI ECONOMICS & RURA  UNIV OF CONNECTICUT
  0136386    COTTERILL  R W         15 07 88   31 10 91   STORRS                CON
 FOOD MARKETING POLICY CENTER FOR RESEARCH AND COORDINATION

CSRS DEL   DEL07842              ANIMAL SCIENCE & AGRI  UNIVERSITY OF DELAWARE
  0134773    ROSENBERGER  J K       26 05 88   30 09 91   NEWARK                DEL
 BIOLOGICAL CONTROL OF SALMONELLOSIS IN CHICKENS

CSRS FLA   FLA-FOS-02280         FOOD SCIENCE & HUMAN   UNIV OF FLORIDA
  0089735    KOBURGER  J A          30 03 83   30 09 88   GAINESVILLE           FLA
 INCIDENCE, DISTRIBUTION AND FATE OF MICROORGANISMS OF PUBLIC HEALTH
 SIGNIFICANCE IN SEAFOODS.

SAES FLA   FLA-FOS-02687         FOOD SCIENCE & HUMAN   UNIV OF FLORIDA
  0133357    MARSHALL  M R          14 10 87   30 09 92   GAINESVILLE           FLA
 QUALITY AND SAFETY OF SEAFOOD PRODUCTS

CSRS FLA   FLA-FOS-02841         FOOD SCIENCE & HUMAN   UNIV OF FLORIDA
  0150092    SITREN  H S            01 12 89   30 09 94   GAINESVILLE           FLA
 PATHOGENICITY OF ESTUARINE AND MARINE VIBRIO VULNIFICUS IN MICE

CSRS GEO   GEO00358              PLANT PATHOLOGY        GEORGIA COASTAL PLAIN EX
  0088440    WILSON  D M            01 10 82   30 09 88   TIFTON                GA
 MYCOTOXINS OF CORN AND OTHER FEED GRAINS

CSRS GEO   GEO00536              FOOD SCIENCE & TECHNO  UNIVERSITY OF GEORGIA
  0137286    HARRISON  M A          01 02 89   31 01 94   ATHENS                GA
 FOODBORNE PATHOGENS ASSOCIATED WITH PROCESSED MEAT, POULTRY AND SEAFOOD

CSRS GEO   GEO00888              FOOD SCIENCE           UNIVERSITY OF GEORGIA
  0098003    CARPENTER  J A         01 07 86   30 06 89   ATHENS                GA
 REDUCTION OF PATHOGENS ON MEAT ANIMAL CARCASSES

CSRS GEO   GEO00901              ANIMAL & DAIRY SCIENC  UNIVERSITY OF GEORGIA
  0098641    BARNHART  H M          01 07 86   30 06 90   ATHENS                GA
 A STUDY OF NEWLY RECOGNIZED, POTENTIAL HUMAN PATHOGENS IN PRODUCTS OF ANIMAL
 ORIGIN

CSRS GEO   GEO00936              FOOD SCIENCE & TECHNO  UNIVERSITY OF GEORGIA
  0132439    KOEHLER  P E           01 10 87   30 09 91   ATHENS                GA
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 0[illegible]9820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.     DEPARTMENT                PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR           START DTE   TERM DTE    LOCATION

 BIOLOGICALLY ACTIVE AMINES IN FOOD AND FEED

CSRS GEO    GEO01400              FOOD SCIENCE & TECHNO   GEORGIA AGRIC EXPT STATI
  0131631     BEJCHAT  L R          01 07 87    30 06 91    EXPERIMENT              GA
 SURVIVAL AND DETECTION OF LISTERIA MONOCYTOGENES IN REFRIGERATED AND FROZEN
 FOODS

CSRS HAW    HAW00333-H            FOOD SCIENCE & HUMAN    UNIV OF HAWAII
  0081541     FRANK  H A            01 10 85    30 09 88    HONOLULU               HAW
 ALTERNATIVE FOOD PRESERVATIVES AS INHIBITORS OF CLOSTRIDIA IN CURED MEAT
 PRODUCTS

CSRS IDA    IDA00670              BACTERIOLOGY            UNIV OF IDAHO
  0063450     HEIMSCH  R C          01 07 73    30 12 82    MOSCOW                 IDA
 DISCOVERY AND CONTROL OF NATURAL TOXICANTS IN THE FOOD CHAIN

CSRS IDA    IDA00949              BACTERIOLOGY & BIOCHE   UNIV OF IDAHO
  0138379     BOHACH  G A           01 07 89    30 06 94    MOSCOW                 IDA
 MOLECULAR ANALYSIS OF STAPHYLOCOCCAL AND STREPTOCOCCAL PYROGENIC TOXINS

CSRS ILLU   ILLU-60-0322          HUMAN RESOURCES/FAMIL   UNIVERSITY OF ILLINOIS
  0065678     LOGOMARSINO  J        01 10 88    30 09 93    URBANA                 ILL
 FOOD QUALITY CHANGES AND ENERGY CONSUMPTION ASSOCIATED WITH THERMAL PROCESSING
 IN FOODSERVICE SYSTEM

CSRS ILLU   ILLU-70-0358          VETERINARY RESEARCH     1301 WEST GREGORY DRIVE
  0069022     BUCK  W B             01 10 85    30 09 90    URBANA                 ILL
 OCCURRENCE OF MYCOTOXINS IN FEEDS AND FOODS AND THEIR EFFECTS ON ANIMAL AND
 HUMAN HEALTH

CSRS IND    IND055016                                     PURDUE UNIVERSITY
  0014769     JOHN  TUITE           01 10 89    30 09 94    WEST LAFAYETTE         IND
 FUNGAL DETERIORATION OF CANOLA, CORN, AND SOYBEANS, DETERIORATION AND CONTROL
 OF LOSSES

SAES IND    IND060028S            FOOD SCIENCE            PURDUE UNIVERSITY
  0136141     STEENSON  L R         01 07 88    30 06 91    WEST LAFAYETTE         IND
 REDUCTION OF SALMONELLA IN POULTRY PROCESSING

CSRS IND    IND034025             FOOD & NUTRITION        PURDUE UNIVERSITY
  0077024     SWAMINATHAN  B        01 10 83    30 09 88    WEST LAFAYETTE         IND
 MUTAGENS AND PATHOGENIC BACTERIA IN FOODS AND FEEDS

CSRS IOW    IOW00193              ENTOMOLOGY              IOWA STATE UNIV
  0090030     DAHM  P A             01 04 83    31 03 88    AMES                   IOW
 IOWA CONTRIBUTION, NATIONAL AGRICULTURAL PESTICIDE IMPACT ASSESSMENT PROGRAM
 (NAPIAP)

CSRS IOW    IOW02252              FOOD TECHNOLOGY         IOWA STATE UNIV
  0073074     WALKER  H W           01 10 86    30 09 91    AMES                   IOW
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CURRENT RESEARCH INFORMATION SYSTEM        25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT              PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION

 EFFECT OF COMPOSITION, DEBONING AND PRESERVATION METHODS ON QUALITY OF MEATS

SAES IOW    IOW02365             FOOD TECHNOLOGY         IOWA STATE UNIV
  0079501     WALKER  H W            01 07 87   30 06 92   AMES               IOW
 BACTERIAL AND FUNGAL SPORES IN FOOD AND FEED

CSRS IOW    IOW02380             ANIMAL SCIENCE          IOWA STATE UNIV
  0079302     HASIAK  R J            01 10 87   30 09 92   AMES               IOW
 MICROBIOLOGY AND CONTROL OF QUALITY OF POULTRY PRODUCTS

CSRS IOW    IOW02406             FOOD TECHNOLOGY         IOWA STATE UNIV
  0080424     KRAFT  A A             01 10 85   30 09 90   AMES               IOW
 OCCURRENCE OF MYCOTOXINS IN FEEDS AND FOODS AND THEIR EFFECTS ON ANIMAL AND
 HUMAN HEALTH

CSRS IOW    IOW02678             MICROBIOLOGY            IOWA STATE UNIV
  0093037     HARTMAN  P A           01 07 89   30 06 94   AMES               IOW
 MICROBIAL BIOTECHNOLOGY OF HUMAN FOODS AND ANIMAL FEEDS

CSRS IOW    IOW02756             ANIMAL SCIENCE          IOWA STATE UNIV
  0097027     MOLINS  R A            01 11 85   30 09 90   AMES               IOW
 SURFACE TREATMENT, IRRADIATION AND PRESERVATION METHOD EFFECT ON MEAT QUALITY

CSRS IOW    IOW02932             ANIMAL SCIENCE          IOWA STATE UNIV
  0150352     OLSON  D G             15 06 89   30 06 91   AMES               IOW
 ENHANCEMENT OF THE SAFETY OF PORK PRODUCTS

CSRS IOW    IOW02955             FOOD TECHNOLOGY         IOWA STATE UNIV
  0151257     MURPHY  P A            01 07 90   30 06 95   AMES               IOW
 FUMONISINS AND OTHER MYCOTOXINS PRODUCED BY FUSARIUM MONILIFORME

CSRS IOW    IOW02991             VETERINARY MICROBIOLO   IOWA STATE UNIV
  0151956     BERAN  G W             01 07 90   30 06 91   AMES               IOW
 ENHANCEMENT OF THE SAFETY OF PORK PRODUCTS

CSRS KAN    KAN09693             ANIMAL SCIENCE & INDU   KANSAS STATE UNIV
  0138605     KASTNER  C L           15 06 89   30 06 91   MANHATTAN          KAN
 ANIMAL SCIENCE FOOD SAFETY CONSORTIUM KANSAS STATE UNIVERSITY

CSRS KY.    KY00302              ANIMAL SCIENCE          UNIV OF KENTUCKY
  0058681     KEMP  J D              01 10 84   30 09 88   LEXINGTON           KY
 MICROBIOLOGY AND QUALITY OF FRESH AND CURED HAMS

CSRS KY.    KY01213              ENTOMOLOGY              UNIV OF KENTUCKY
  0089782     PASS  B C              15 04 83   31 10 87   LEXINGTON           KY
 PESTICIDE IMPACT RESEARCH AND DATA ANALYSIS

SAES LA.B   LAB02486             FOOD SCIENCE            LOUISIANA STATE UNIVERSI
  0097364     FINERTY  M             01 11 85   30 09 88   BATON ROUGE         LA
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990         CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT               PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR          START DTE   TERM DTE   LOCATION

 BIOPHYSICAL COMPOSITION OF CRAYFISH AS INFLUENCED BY THE ENVIRONMENT

SAES LA.B  LAB02722              FOOD SCIENCE             LOUISIANA STATE UNIV & A
  0136032    MARSHALL  D L         01 10 88   30 09 91   BATON ROUGE            LA
 EFFECTS OF PRESERVATION TECHNIQUES ON GROWTH OF PATHOGENIC BACTERIA IN
 LOUISIANA MUSCLE FOODS

CSRS MAS   MAS00345              FOOD SCIENCE & NUTRIT  UNIV OF MASSACHUSETTS
  0061946    LEVIN  R E            01 10 83   30 09 89   AMHERST               MAS
 IMPROVING THE ASSURANCE OF QUALITY AND SAFETY OF CONSUMERS-FOOD

CSRS MAS   MAS00586              FOOD SCIENCE & NUTRIT  UNIV OF MASSACHUSETTS
  0093871    LEVIN  R E            01 10 84   30 09 87   AMHERST               MAS
 STUDIES ON THE METABOLISM AND PHYSIOLOGY OF OBLIGATELY PSYCHROPHILIC FISH
 SPOILAGE BACTERIA

SBIR MASK  MASK-8700912          HYBRIVET                 638 METROPOLITAN AVE.
  0034398    HUNTER  M M           01 09 87   29 02 88   HYDE PARK             MAS
 DETECTION OF ERYTHROMYCIN IN ANIMAL DERIVED PRODUCTS

CSRS MD.   MD-JH-118             BOTANY                   UNIV OF MARYLAND
  0088903    BEAN  G A             01 10 82   30 09 89   COLLEGE PARK          MD
 MYCOTOXINS OF CORN AND OTHER FEED GRAINS

CSRS MD.   MD-M-230              POULTRY SCIENCE          UNIV OF MARYLAND
  0096582    DOERR  J A            01 10 85   30 09 88   COLLEGE PARK          MD
 MYCOTOXICOSES IN COMMERCIAL POULTRY:  DESCRIPTIVE TOXICOLOGY AND PREVENTIVE
 MEASURES

CSRS ME.   ME08370               ANIMAL & VETERINARY S  UNIVERSITY OF MAINE
  0138483    OPITZ  M              01 10 89   30 09 92   ORONO                 ME
 TRANSOVARIAN TRANSMISSION OF SALMONELLA ENTERITIDIS IN IMMUNOSUPPRESSED
 CHICKENS

CSRS ME.   ME35182                                        UNIVERSITY OF MAINE
  0139393    OPITZ  H M            01 09 89   31 08 91   ORONO                 ME
 SALMONELLA ENTERITIDIS: EPIDEMIOLOGY VIRULENCE FACTORS AND PATHOGENESIS

CSRS MICL  MICL01344             FOOD SCIENCE & HUMAN   MICHIGAN STATE UNIV
  0079864    GRAY  J I             01 10 86   30 09 91   EAST LANSING          MIC
 THE EFFECTS OF PROCESSING, COOKING & STORAGE ON THE ACCEPTABILITY & SAFETY OF
 FOOD PRODUCTS

CSRS MICL  MICL01403             AGRI ECONOMICS           MICHIGAN STATE UNIV
  0084333    VAN RAVENSWAAY  E     12 06 84   30 09 90   EAST LANSING          MIC
 A STUDY OF REGULATORY DECISION-MAKING ON TOXIC SUBSTANCES IN THE FOOD SYSTEM

CSRS MIN   MIN-18-054            FOOD SCIENCE & NUTRIT  UNIV OF MINNESOTA
  0001742    TATINI  S R           01 10 88   30 09 93   ST PAUL               MIN
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FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT                PERFORMING ORGANIZATION
  ACC NO.     INVESTIGATOR          START DTE   TERM DTE   LOCATION

 USE OF METABOLITES OF LACTIC ACID BACTERIA AND HEAT FOR CONTROL OF UNDESIRABLE
 BACTERIA IN FOODS

CSRS MO.   MO-00296-3            PLANT PATHOLOGY          UNIVERSITY OF MISSOURI
  0080505     WYLLIE  T D           01 10 85   30 09 90   COLUMBIA             MO
 OCCURRENCE OF MYCOTOXINS IN FEEDS AND FOODS AND THEIR EFFECTS ON ANIMAL AND
 HUMAN HEALTH

CSRS MO.   MO-00326              FOOD SCIENCE & NUTRIT   UNIVERSITY OF MISSOURI
  0099438     CLARKE  A D           01 10 86   30 09 91   COLUMBIA             MO
 DEVELOPMENT OF NEW PROCESSES AND TECHNOLOGIES FOR THE PROCESSING OF POULTRY
 PRODUCTS

CSRS MO.   MO-00336              FOOD SCIENCE & NUTRIT   UNIVERSITY OF MISSOURI
  0057422     MARSHALL  R T         01 07 85   30 06 91   COLUMBIA             MO
 MICROORGANISMS AND HYDROLYTIC ENZYMES IN FOODS

CSRS MO.   MO-00348              FOOD SCIENCE & NUTRIT   UNIVERSITY OF MISSOURI
  0091994     CLARKE  A D           01 01 84   30 09 89   COLUMBIA             MO
 FUNCTIONAL PARAMETERS OF MUSCLE FOODS PROCESSES

SAES MO.   MO-00478              AGRI ENGINEERING         UNIVERSITY OF MISSOURI
  01[illegible]5078     HSIEH  F              01 07 88   30 06 93   COLUMBIA             MO
 NEW AND IMPROVED PROCESSES FOR AGRICULTURAL RAW MATERIALS AND BY-PRODUCTS

CSRS NC.   NC02174               FOOD SCIENCE             NORTH CAROLINA STATE UNI
  0139174     SHELDON  B W          01 10 89   30 09 94   RALEIGH              NC
 EFFICACY OF BACTERIOCINS IN CONTROLLING POULTRY FOOD-BORNE PATHOGENS AND
 SPOILAGE MICROORGANISMS

SAES NC.   NC05569               POULTRY SCIENCE          NORTH CAROLINA STATE UNI
  0093320     PARKHURST  C R        01 07 84   31 12 87   RALEIGH              NC
 RESEARCH SUPPORT TO INVESTIGATE TERATOGENIC EFFECTS OF ENVIRONMENTAL AGENTS
 USING AVIAN SPECIES

SAES NC.   NC05663               POULTRY SCIENCE          NORTH CAROLINA STATE UNI
  0132960     JONES  F T            01 10 87   30 09 90   RALEIGH              NC
 STRATEGIES TO REDUCE ENTERIC PATHOGENS IN POULTRY

CSRS NC.X  NC.X-079-5-86-120-1   ANIMAL SCIENCE           NORTH CAROLINA A&T STATE
  0096501     WILLIS  W L           01 10 85   30 09 89   GREENSBORO           NC
 INVESTIGATIONS OF CAMPYLOBACTER JEJUNI IN POULTRY PRODUCTION ENVIRONMENTS ON
 HEALTH AND PERFORMANCE

CSRS NEB   NEB-14-040            VETERINARY SCIENCE       UNIVERSITY OF NEBRASKA
  0097895     SCHNEIDER  N R        01 10 85   30 09 90   LINCOLN              NEB
 OCCURRENCE OF MYCOTOXINS IN FEED AND FOODS AND THEIR EFFECTS ON ANIMAL AND
 HUMAN HEALTH

CSRS NEB   NEB-16-039            FOOD SCIENCE & TECHNO    UNIVERSITY OF NEBRASKA
  0088676     MAXCY  R B            01 01 83   31 12 87   LINCOLN              NEB
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CURRENT RESEARCH INFORMATION SYSTEM          25 OCT 1990          CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.     DEPARTMENT                  PERFORMING ORGANIZATION
  ACC NO.     INVESTIGATOR            START DTE    TERM DTE    LOCATION

 IRRADIATION OF MEATS FOR IMPROVING THE MICROBIAL QUALITY

CSRS NEB   NEB-16-043             FOOD SCIENCE & TECHNO  UNIVERSITY OF NEBRASKA
  0096063    SUMNER  S                 15 07 85    14 07 90    LINCOLN               NEB
 OCCURRENCE, DETECTION, AND CONTROL OF PATHOGENIC BACTERIA IN FOODS

CSRS NEB   NEB-16-046             FOOD SCIENCE & TECHNO  UNIVERSITY OF NEBRASKA
  0097650    RUPNOW  J M               01 01 66    31 12 90    LINCOLN               NEB
 STUDIES ON NATURALLY OCCURRING SUBSTANCES THAT AFFECT THE NUTRITIONAL QUALITY
 OF NEW FOOD PLANTS

CSRS NH.   NH00205                ZOOLOGY                UNIVERSITY OF NEW HAMPSH
  0055497    SASNER  J J               01 10 89    30 09 92    DURHAM                NH
 IDENTIFICATION AND IMPACT OF ALGAL TOXINS IN WATER SUPPLIES

CSRS NJ.   NJ01112                BIOCHEMISTRY & MICROB  RUTGERS UNIVERSITY PO BO
  0005031    KATZ  S E                 01 10 89    30 09 93    NEW BRUNSWICK         NJ
 ROLE OF NON-NUTRITIVE ADDITIVES IN ANIMAL AGRICULTURE-MINIMIZATION OF
 SALMONELLA

CSRS NJ.   NJ10201                FOOD SCIENCE           RUTGERS UNIVERSITY PO BO
  0061855    ROSEN  J                  01 10 83    30 09 89    NEW BRUNSWICK         NJ
 IMPROVING THE ASSURANCE OF QUALITY AND SAFETY OF CONSUMER'S FOOD

SAES NJ.   NJ10516                FOOD SCIENCE           RUTGERS UNIVERSITY PO BO
  0081938    DAUN  H                   01 04 80    30 06 91    NEW BRUNSWICK         NJ
 QUALITY AUDIT IN NEW JERSEY FOODS DISTRIBUTION PROGRAM

SAES NJ.   NJ10540                FOOD SCIENCE           RUTGERS UNIVERSITY PO BO
  0132422    MONTVILLE  T J            01 03 87    30 09 90    NEW BRUNSWICK         NJ
 FEASIBILITY STUDY ON THE USE OF SODIUM BICARBONATE TO REDUCE AFLATOXIN
 CONTAMINATION OF GRAINS

SAES NJ.   NJ10543                FOOD SCIENCE           RUTGERS UNIVERSITY PO BO
  0099987    ROSEN  J D                01 07 86    31 12 88    NEW BRUNSWICK         NJ
 QUANTIFICATION OF FOOD MUTAGENS AND THEIR METABOLITES

CSRS NY.C  NYC-143403             FOOD SCIENCE           CORNELL UNIVERSITY
  0078239    POTTER  N N               01 02 84    30 09 89    ITHACA                NY
 IMPROVING THE ASSURANCE OF QUALITY AND SAFETY OF CONSUMERS' FOOD

CSRS NY.C  NYC-143420             FOOD SCIENCE           CORNELL UNIVERSITY
  0139975    HOTCHKISS  J H            13 11 89    30 09 92    ITHACA                NY
 SAFETY AND QUALITY OF REFRIGERATED FOODS PACKAGED WITH MODIFIED ATMOSPHERES

SAES NY.C  NYC-176315             OFFICE OF RESEARCH     CORNELL UNIVERSITY
  0013142    LISK  D                   01 10 87    30 09 90    ITHACA                NY
 FATE AND EFFECTS OF TOXICANTS IN AGRICULTURAL AND ENVIRONMENTAL FOOD CHAINS

CSRS NY.C  NYC-176478             OFFICE OF RESEARCH     CORNELL UNIVERSITY
  0074489    LISK  D J                 01 10 87    30 09 92    ITHACA                NY
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CURRENT RESEARCH INFORMATION SYSTEM         25 OCT 1990         CRIS ID 029820
FOOD SAFETY:  MEAT/POULTRY/FISH  -- NON-FEDERAL INSTITUTIONS

AGENCY ID  WORK UNIT/PROJ NO.    DEPARTMENT              PERFORMING ORGANIZATION
  ACC NO.    INVESTIGATOR           START DTE   TERM DTE   LOCATION

 THE BIOCHEMISTRY AND FATE OF PESTICIDES IN AGRICULTURAL USE

CSRS NY.C  NYC-199449            NUTRITIONAL SCIENCES   CORNELL UNIVERSITY
  0092160    ROE  D A               04 01 84   31 12 87   ITHACA              NY
 HEALTH RISKS OF HIGH IODINE CONSUMPTION: A STUDY OF NEW YORK STATE FARM
 FAMILIES

SAES NY.C  NYC-399364            NUTRITIONAL SCIENCES   CORNELL UNIVERSITY
  0097931    ARMBRUSTER  G          01 11 85   30 09 88   ITHACA              NY
 ALTERNATE METHODS OF TRIMMING & COOKING OF STRIPED BASS:  EFFECT ON FLAVOR &
 REDUCTION OF PCB RESIDU

CSRS NY.G  NYG-623372            FOOD SCIENCE & TECHNO  N Y AGRICULTURE EXPT STA
  0085370    SPITTLER  T D          01 03 83   30 09 87   GENEVA              NY
 NORTHEAST REGIONAL LABORATORY FOR ANALYSIS OF ANIMAL DRUGS FOR MINOR USES

CSRS NY.G  NYG-623373            FOOD SCIENCE & TECHNO  N Y AGRICULTURE EXPT STA
  0131219    BOURKE  J B            01 03 87   30 09 88   GENEVA              NY
 NORTHEAST REGIONAL LABORATORY FOR ANALYSIS OF ANIMAL DRUGS FOR MINOR USES

CSRS NY.G  NYG-623375            FOOD SCIENCE & TECHNO  N Y AGRICULTURE EXPT STA
  0134727    BOURKE  J B            01 03 88   30 09 91   GENEVA              NY
 NORTHEAST REGIONAL LABORATORY FOR ANALYSIS OF ANIMAL DRUGS FOR MINOR USES

CSVM NYCV  NYCV-479-501          EQUINE DRUG TESTING    CORNELL UNIVERSITY
  0130504    HENION  J D            01 10 86   30 09 89   ITHACA              NY
 ANALYTICAL METHODS FOR THE DETERMINATION OF ANABOLIC AGENTS IN FOOD PRODUCING
 ANIMALS

CSRS OHO   OHO00847              POULTRY SCIENCE        OHIO STATE UNIV
  0099978    STEPHENS  J F          01 10 86   30 09 91   COLUMBUS            OHO
 DEVELOPMENT OF NEW PROCESSES AND TECHNOLOGIES FOR THE PROCESSING OF POULTRY
 PRODUCTS

SAES ORE   ORE00062              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0060071    BAILEY  G S            01 04 87   31 03 92   CORVALLIS           ORE
 METABOLISM AND CARCINOGENICITY OF AFLATOXINS AND OTHER FOOD-BORNE CARCINOGENS

CSRS ORE   ORE00108              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0061550    BAILEY  G S            01 10 87   30 09 92   CORVALLIS           ORE
 IMPROVE FOOD SAFETY THROUGH DISCOVERY AND CONTROL OF NATURAL AND INDUCED
 TOXICANTS

SAES ORE   ORE00401              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0098294    TORRES  J A            01 05 86   30 04 91   CORVALLIS           ORE
 INVESTIGATION OF MICROBIAL STABILITY OF REFRIGERATED INTERMEDIATE MOISTURE
 FOODS:  EFFECTS OF TEMP

CSRS ORE   ORE00424              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0079417    LIBBEY  L M            01 01 86   31 12 91   CORVALLIS           ORE
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 TRACE ORGANIC ANALYSIS OF FOODS BY COMPUTERIZED GAS CHROMATOGRAPHY/MASS
 SPECTROMETRY

CSRS ORE   ORE00704              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0082429    SCANLAN  R A          01 08 80   31 12 86   CORVALLIS             ORE
 PREVENTION OF FORMATION OF N-NITROSO COMPOUNDS IN FOODS

CSRS ORE   ORE00707              FOOD SCIENCE & TECHNO  OREGON STATE UNIV
  0091225    SELIVONCHICK  D P     01 09 83   31 08 88   CORVALLIS             ORE
 CYCLOPROPENOID FATTY ACID INDUCED PROTEASE ACTIVITY AS A MECHANISM OF
 COCARCINOGENICITY

SAES ORE   ORE00911              FISHERIES & WILDLIFE   OREGON STATE UNIV
  0084309    CURTIS  L R           01 07 86   30 06 91   CORVALLIS             ORE
 TEMPERATURE EFFECTS ON XENOBIOTIC ELIMINATION BY FISHES

CSRS PEN   PEN02314              PESTICIDE LABORATORY   PENNSYLVANIA STATE UNIVE
  0071528    MUMMA  R O            01 01 83   30 09 87   UNIVERSITY PARK    PA
 THE METABOLISM AND FATE OF PESTICIDES AND THEIR RESIDUESIN OR ON AGRICULTURAL
 COMMODITIES

CSRS TEN   TEN00926              FOOD TECHNOLOGY & SCI  UNIVERSITY OF TENNESSEE
  0137459    DAVIDSON  P M         13 02 89   30 09 93   KNOXVILLE             TEN
 SPECTRUM AND MECHANISMS OF ANTIMICROBIALS IN FOODS

CSRS TEX   TEX03751              VETERINARY PUBLIC HEA  TEXAS A&M UNIV
  0088278    PHILLIPS  T D         01 10 82   30 09 88   COLLEGE STATION     TEX
 MYCOTOXINS OF CORN AND OTHER FEED GRAINS

CSRS TEX   TEX06215              VETERINARY PUBLIC HEA  TEXAS A&M UNIV
  0080510    PHILLIPS  T D         01 10 86   30 09 91   COLLEGE STATION     TEX
 DEVELOPMENTAL TOXICITY OF MYCOTOXINS:  MECHANISMS OF ACTION/INTERACTION AND
 DETOXIFICATION

CSRS TEX   TEX06425              ANIMAL SCIENCE         TEXAS A&M UNIV
  0080473    VANDERZANT  C         01 10 86   30 09 91   COLLEGE STATION     TEX
 MICROBIAL ISOLATIONS AND SAFETY IN FOOD PRODUCTS

CSRS TEX   TEX06617              VETERINARY PHYSIOLOGY  TEXAS A&M UNIV
  0088225    SAFE  S               07 08 87   31 07 92   COLLEGE STATION     TEX
 ENVIRONMENTAL TOXICOLOGY OF HALOGENATED AROMATIC COMPOUNDS

CSRS TEX   TEX06735              VETERINARY ANATOMY     TEXAS A&M UNIV
  0093599    IRVIN  T R            04 09 84   30 09 90   COLLEGE STATION     TEX
 PREDICTIVE TESTS FOR MYCOTOXICITY

SAES TEX   TEX06743              ANIMAL SCIENCE         TEXAS A&M UNIV
  0094596    FINNE  G              30 09 84   30 09 89   COLLEGE STATION     TEX
 THE USE OF CHEMICAL ADDITIVES TO PREVENT DISCOLORATION IN FRESH AND FROZEN
 SHRIMP
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CSRS TEX   TEX06825              VETERINARY ANATOMY     TEXAS A&M UNIV
  0097950    IRVIN  T R            14 02 86   30 09 88   COLLEGE STATION    TEX
 DIAGNOSTIC ASSAYS FOR MYCOTOXIN-INDUCED REACTIVATION OF INTEGRATED IBR VIRUS

CSRS TEX   TEX06874              ANIMAL SCIENCE         TEXAS A&M UNIV
  0130116    VANDERZANT  C         01 10 86   30 09 91   COLLEGE STATION    TEX
 MICROBIAL DECONTAMINATION OF POULTRY BY ACID TREATMENT

CSRS TEX   TEX06884              ANIMAL SCIENCE         TEXAS A&M UNIV
  0130758    KEETON  J T           01 01 87   31 12 90   COLLEGE STATION    TEX
 IMPROVING THE VALUE AND SAFETY OF PROCESSED MEATS

SAES TEX   TEX06925              VETERINARY MICROBIOLO  TEXAS A&M UNIV
  0134062    LEWIS  D H            19 01 88   31 12 91   COLLEGE STATION    TEX
 PROBE TECHNIQUES FOR MICROBIAL PROCESSING

CSRS TEX   TEX06981              VETERINARY PHYSIOLOGY  TEXAS A&M UNIV
  0137539    BROWN  S A            20 02 89   30 09 91   COLLEGE STATION    TEX
 TISSUE DRUG RESIDUE DEPLETION IN DISEASED CATTLE

CSRS UTA   UTA00112              ANIMAL DAIRY & VET SC  UTAH STATE UNIVERSITY
  0086906    SHARMA  R P           01 07 87   30 06 92   LOGAN              UTA
 IMMUNOTOXICITY OF NATURALLY-OCCURRING FEED CONTAMINANTS

SBIR UTAK  UTAK-8602406          LEE SCIENTIFIC INC     4426 SOUTH CENTURY DRIVE
  0034363    LATER  D W            15 09 86   30 09 88   SALT LAKE CITY     UTA
 SUPERCRITICAL FLUID EXTRACTION AND ANALYSIS OF RESIDUE IN MEATS

CSRS VI.   VI-02-20-530-XX-786   UNIV OF THE VIRGIN IS  R R #02 BOX 10000, KINGS
  0097178    MCMILLAN  J P         01 11 85   31 10 88   ST CROIX           VI
 RELATION OF G. TOXICUS AND CARIBBEAN CIGUATOXIN IN CARRIER FOODFISH TO HUMAN
 CIGUATERA POISONING

CSRS WIS   WIS01878              VETERINARY SCIENCE     UNIV OF WISCONSIN
  0061814    HANSON  R P           01 10 82   30 09 87   MADISON            WIS
 PATHOGENESIS, BIOECOLOGY, AND CONTROL OF AVIAN RESPIRATORY DISEASES

CSRS WIS   WIS02829              FOOD MICROBIOLOGY & T  UNIV OF WISCONSIN
  0091157    DOYLE  M P            15 07 83   31 10 86   MADISON            WIS
 ASSOCIATION OF CAMPYLOBACTER JEJUNI WITH FOODS OF ANIMAL ORIGIN

CSRS WIS   WIS02947              FOOD MICROBIOLOGY & T  UNIV OF WISCONSIN
  0095903    DOYLE  M              01 07 85   30 09 87   MADISON            WIS
 INFLUENCE OF POLYPHOSPHATES ON MICROORGANISMS OF SIGNIFICANCE IN PROCESSED
 MEATS AND MEAT PRODUCTS

SAES WIS   WIS05053              MEAT & ANIMAL SCIENCE  UNIV OF WISCONSIN
  0060681    CASSENS  R G          01 09 71   30 06 80   MADISON            WIS
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  ACC NO.    INVESTIGATOR           START DTE   TERM DTE   LOCATION

 FATE OF NITRATE AND NITRITE IN PROCESSED MEATS AND IN THE LIVING ANIMAL

CSRS WN.P  WNP00216              FOOD SCIENCE & HUMAN    WASHINGTON STATE UNIVERS
  0067625    SWANSON  B G           01 10 87   30 09 92   PULLMAN               WN
 IMPROVE FOOD SAFETY THROUGH DISCOVERY AND CONTROL OF NATURAL AND INDUCED
 TOXICANTS

CSRS WYO   WYO-134-83            VETERINARY SCIENCE      UNIVERSITY OF WYOMING
  0089267    PIER  A C              01 10 87   30 09 92   LARAMIE              WYO
 IMPROVE FOOD SAFETY THROUGH DISCOVERY AND CONTROL OF NATURAL AND INDUCED
 TOXICANTS

CSRS WYO   WYO-237-89            ANIMAL SCIENCE          UNIVERSITY OF WYOMING
  0135146    RAY  B                 01 10 88   30 09 91   LARAMIE              WYO
 BIOPRESERVATION OF VACUUM-PACKAGED REFRIGERATED BEEF.
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Question 3. Since ARS and CSRS are the only two scientific research arms of the Department of Agriculture, will you detail for the committee how other agencies within the Department get their top research needs addressed? Please outline the process within the Department for prioritizing research projects based on the needs identified by individual agencies within the Department?

Answer. Requests for specific agricultural research projects are submitted to the administrators of the research agencies, and may be undertaken through the use of a Memorandum of Understanding, or other form of interagency agreement. Regulatory agencies seeking research establish priorities on such requests, and this information is considered in the implementation of the research program. Agencies may also seek inclusion of their research needs in the Joint Council on Food and Agricultural Sciences' priority-setting system. Authority exists for contracts and cooperative agreements and land-grant colleges and universities to conduct research on behalf of the Department. In some instances a combination of university scientists and ARS scientists may be used to conduct research on behalf of the Department. It should be noted that several other Federal agencies maintain agreements with the Department for conduct of Agricultural Research. The Committee on Food, Agricultural, and Forestry Research of the Federal Coordinating Council for Science, Engineering and Technology is used to coordinate agriculture and forestry research among the Federal agencies.

Question 4. Please provide the committee with a list of the projects that you anticipate to fund in FY 1990 to address the needs of the Food Safety and Inspection Service (FSIS) specifically?

Answer. Included among ARS research projects provided specifically to support the Food Safety Inspection Service are the following:

—Multiresidue identification methods for testing food animal tissues.

—Determine relationships between surrogate tissues and target tissue for selected analytes to form the basis for implant tests.

—Analytical methods for temperatures at which meat has been cooked.

—Determination of product safety criteria for nonhomogeneous products.

—Control of *Salmonella* in domestic animals.

—Control foodborne pathogens in red meat through carcass washing or other means.

—Reduce incidence of toxoplasma infected pork.

—Improve the microbiological and chemical quality of processing water so it can be recycled.

—Develop methods capable of identifying meats and poultry that have been subjected to low-dose ionizing radiation.

—Identify the factors affecting the survival and/or toxin production of/by foodborne microbial pathogens and in fresh or frozen meat and poultry exposed to low or pasteurizing doses of ionizing radiation while maintaining maximal vitamin content, especially of thiamine and vitamin E.

PREPARATION FOR THE 1990 FARM BILL

Funding of Agricultural Research

THURSDAY, JULY 27, 1989

U.S. Senate, Subcommittee on Agricultural Research and General Legislation of the Committee on Agriculture, Nutrition, and Forestry,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m., in room SR–332, Russell Senate Office Building, Hon. Thomas A. Daschle (chairman of the subcommittee) presiding.

Present or submitting a statement: Senators Daschle and Harkin.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator Daschle. The hearing will come to order.

I want to thank everyone for coming this morning to talk about an issue that is of great interest to this subcommittee.

This is the third in a series of hearings that the subcommittee is holding to examine the agricultural research system. In the previous two hearings, we have investigated priority setting for agricultural research programs.

Today I would like to examine the funding mechanism for the agricultural research system itself. To accomplish that goal, we are going to examine the programs which are responsible for allocation of funding and, more specifically, examine the area of alternative agricultural crops and products, determine how programs and funds have been used in the past.

The research component of the 1990 farm bill will not only be important during the upcoming year, but the research programs and moneys that are allocated for those programs will influence agriculture well into the 21st century. The systems which are used to allocate these funds—competitive grants, formula funds, special grants—have a major influence on the agricultural research community. The intent of the scientific research system is to answer questions. I trust that the questions that are being answered by our agricultural research system are questions that meet the needs of the agricultural community and society, not just the questions that the research community can answer because they are areas which are easily fundable.

The agricultural system has served us well. The Morrill Act was established to provide an essential tool in establishing the United

States as the leader in food production and agricultural research. The Hatch Act, which provides funding through the Cooperative State Research Service, and the Smith-Lever Act, which provides funding for the Cooperative Extension Service, have been paramount to solving States' specific agricultural needs. In recent years, emphasis by many of the agricultural research community has been to allocate the limited supply of Federal dollars through the competitive research grants. One of the primary purposes of the competitive grant system is to encourage basic research and to attract nonland-grant researchers into the agricultural research arena. Witnesses who have testified before this subcommittee in our two previous hearings have verified that this process is actually occurring, and more nonland-grant researchers are receiving funds through the competitive grant programs.

As researchers become more removed from producers, the possibility of overlooking producers' needs may exist, and less glamorous areas of research, such as alternative crops and products, may be neglected. Throughout history, the emphasis for agricultural production has been to produce more. This is an admirable goal, but our emphasis on producing more has led to considerable surpluses which are the root of many of our current agricultural problems.

There have been several proposed solutions to solving the surplus situation. Producing food using sustainable systems has been suggested as one route. Another, of which I have been a supporter for quite some time, is the development of alternative crops and products. Using surplus grains to produce fuels, such as the ethanol industry has been doing for many years, is an excellent way to support our farmers in the rural communities. Another area that we will hear considerably more about today is the development of alternative crops. These crops offer producers of agricultural commodities an alternative to their present cropping system, and cannot only lead to reductions in grain surpluses, but benefit our areas of the economy by providing improved technologies, such as high quality industrial oils.

Today, as we examine the agricultural research funding system, we must remember that Federal funds are limited, and the hearing will give us a better indication of how these limited funds are allocated and how alternative crop and product programs have been affected.

I want to thank those who have committed to testifying before this subcommittee this morning. I am very pleased with the caliber of the panels that we have. There are two panels. The first panel is comprised of Dr. Keith Huston, the director-at-large of the North Central State Agricultural Experiment Station in Wooster, Ohio, and Dr. Norman Scott, who is the vice president for Research and Advanced Studies of Cornell University, Ithaca, New York.

Dr. Huston and Dr. Scott, we are pleased that you are here with us this morning. Dr. Huston, let me begin by welcoming you and encouraging you to present your testimony at this time.

Let me emphasize that the entire text of all of the prepared statements presented this morning will be made part of the record. In order to facilitate as much discussion and as little monologue as possible, I prefer to keep our opening statements to 5 minutes, and then we will enter into a good discussion following that.

So with those opening remarks, Dr. Huston, let us begin with you.

The prepared statement of Senator Harkin will be inserted at this point in the hearing record.

[The prepared statement of Senator Harkin follows:]

Prepared Statement of Hon. Tom Harkin, a U.S. Senator From Iowa

Mr. Chairman: I very much appreciate your holding this hearing on agricultural research. This may not be one of those headline grabbing subjects. But, agricultural research is crucial for agriculture. Farmers do not see the benefits of today's research immediately. But, in the long term, it is research that will bring us new alternative uses for crops, reduce production costs and reduce water contamination and erosion.

We are all aware of the fact that our agricultural factory, with its level of technology, superior natural resource base, and the amazing productive capacity of the American farmer, can outproduce most of the other countries of the world combined. Such a reality is a blessing and a curse. The blessing is that we can meet all of our Nation's food and fiber needs with ease and at a low cost. The down side is that we overproduce. The result has been the lowering of the value of both our commodities and our land.

In the long term, the agricultural problem is more than a question of production levels or of export markets. It is also a problem of insufficient diversification. We lack diversification in many areas of the country where only a few commodities are produced. We also lack diversification in the range of end uses for which our agricultural commodities might be used.

As our capacity to produce traditional commodities such as corn or soybeans increases, our farmers face three choices. First, there can be greater and greater levels of production in excess of demand, but this means lower prices that will not cover the costs of production. Second, we can leave part of our farm land idle. Or, we can find new uses for our crops. I believe that the last option is the best solution. It is a solution that will take many years to implement.

USDA has been all too often directed at improving yields of existing crops. While it is important to remain competitive, we must recognize the problems that go along with overproduction.

I have introduced the Alternative Agricultural Products Research Act in this Congress which is similar to legislation which passed the Senate in the last Congress. Senator Conrad has introduced a bill providing for assistance in the commercialization of alternative products. Senator Bond has introduced legislation providing for protection of crop acreage bases when alternative crops are grown. I believe that these legislative initiatives can open up tremendous new opportunities for farmers and all of rural America.

As we consider these and other measures, we need to understand exactly how research funding decisions are now made. We need to look at the specific funding mechanisms that now exist understanding the benefits and the negative factors in each funding system. I am hopeful that this hearing will be helpful in improving that understanding.

STATEMENT OF KEITH HUSTON, DIRECTOR-AT-LARGE, NORTH CENTRAL REGIONAL ASSOCIATION OF STATE AGRICULTURAL EXPERIMENT STATION DIRECTORS, WOOSTER, OH

Dr. **Huston**. Thank you, Mr. Chairman.

FUNDING

In the late 1800's, Congress set in motion the forces that created our dual system of State and Federal research. Today, the State system is about twice as large as the Federal system. The Federal system is entirely supported by Federal funds. The base programs of the State system are principally supported by State funds but also receive imported dependable support through Federal formula funds. The State experiment stations which I represent dominate the State system with 90 percent of the scientists. That is fitting because the stations in most States have been assigned statewide responsibility for all research needs of agriculture, forestry, rural homes and community, also for related concerns such as natural resources, the environment, and diet and nutrition.

CONCERNED ABOUT FUTURE EXPORT MARKETS

Our States, and mine in the Midwest in particular, are concerned about future export markets. Our foreign competitors have dramatically increased their investments in research and education.

MORE STABILITY FOR AGRICULTURE

My States are also concerned about providing more stability for agriculture, finding new crops, uses and products as an avenue. Modest increases in funds by State governments have kept our national research system almost at 1970 levels, even though Federal capacity has declined. But our competitors are getting steadily stronger.

STRAPPED FOR CASH

Our dual national system is effective and strong. I doubt that you will find any other research investment by governments that has been so profitable. But, frankly, we are strapped for cash. New forces on the State scene make us wonder how long State governments will be able to pick up the slack left by reduced Federal investments as measured by real buying power.

THE CONGRESS HAS PROVIDED FUNDS THROUGH THE USDA FOR STATE EXPERIMENT STATIONS

Since the 1890's, the Congress has provided funds through the USDA for State experiment stations. They are distributed among the States by a formula. The funds are used in the stations, just as the Federal funds are used in Federal agencies, to address critical needs of agriculture as identified by users of that research. We differ from the Federal agencies in that we are the principal supporters and trainers of graduate students, the scientists of tomorrow. We also are linked and an integral part of extension and teaching activities in the State.

Currently, $178 million from USDA are allocated by formula to the experiment stations and other smaller university units. That is 19 percent of the USDA research budget and 12 percent of the State system budget. The formula funds are very important. They increase the capacity of each State's station; they link the State and Federal systems together; and they provide a mechanism for coordinating research among States and with USDA agencies. And, finally, at appropriations time each year, in most cases it causes the States and the Federal Government to once again look at the relationships between the two of them.

I compared funding and programs of South Dakota and New York on a little table that you have. South Dakota has a little larger agriculture, but the comparison highlights some of the complexities of funding of agricultural research. States act independently and they do work together, but in the end it is the Federal Government which must provide the leadership and the glue to bind the programs of the 50 States and the USDA agencies into a coherent and efficient national program.

New forces are emerging in State governments and in State universities. State governments are attempting economic development primarily outside agriculture. That means additional research resources that must come from State funds. The university structure is changing. Individual research by professors has become a driving force. Our experiment stations are a part of the research universities, and our ag scientists must conform.

The other parts of the universities envy our funds from State and Federal governments. Although we try to draw in as many of those scientists as we can, we simply do not have the resources to employ all the scientists in the university. They must seek moneys elsewhere.

The ability of our stations to act in the interest of changing needs of agriculture are diminishing. This is particularly true for the near-term, high payoff, applied or adaptive research. That fuels agricultural progress. Increasing specialization requires team approaches. Grant funds controlled by scientists, not by the station director, are steadily increasing. The agenda for that grant research is set by Federal granting agencies, not by the needs of State users as is the case for base programs. I think this argues very strongly for the importance of the Federal formula funds and the continuing strong support from the Federal Government.

Thank you, Mr. Chairman.

[The prepared statement and attachments of Dr. Huston follow:]

STATEMENT OF KEITH HUSTON, DIRECTOR-AT-LARGE, NORTH CENTRAL REGIONAL ASSOCIATION OF STATE AGRICULTURAL EXPERIMENT STATION DIRECTORS

Mr. Chairman and members of the Committee, "formula funding" is one of several funding mechanisms employed by the federal government to support agricultural research. In 1987, $178 million, about 19% of the $932 million spent by the USDA for agricultural research, was allocated by formulas to cooperating state research units, most affiliated with land grant state universities. Most of that ($154 million) went to the State Agricultural Experiment Stations. But, in the larger context of the Nation's publicly supported research, formula funding accounts for just 8% of the national investment in public agricultural research.

The Importance of Formula Funding

Formula funding is important to the nation in several ways. First, it links the smaller USDA federal research system with the larger state agricultural experiment station system and other affiliated state units to create a national system. Second, it enlarges the capacity and flexibility of state units to respond to local, state and regional agricultural needs. Third, it focuses attention on the need for broad national policies to establish the appropriate roles of federal and state governments in agriculture and agricultural research. Fourth, it creates a regional mechanism for coordinating state and federal research.

Linking Federal and State Research Efforts

Unlike other fields of public research where federal agencies provide most of the intramural and extramural funds for research, agricultural research has two major funding sources - state and federal governments. Each provides the major share of resources of its own research agencies, excepting the 1890 state institutions whose research is almost completely supported by the federal funds. The research agencies of the states, the State Agricultural Experiment Station System, perform about 60% of the Nation's public research. National interests best can be served by permanent cooperative linkages between USDA Agencies and the SAES and other state units. The linkages are important in achieving national efficiency and cohesiveness in responding to the needs of agriculture. Formula funds provide these linkages. About 12% of the SAES funds are federal formula funds. Formula funds provided through the USDA create a sense of partnership and cooperative interdependency among the state units and the USDA agencies. However, for many larger states, federal formula funds are a relatively small part of their budget. Reciprocal state support for USDA scientists headquartered in the SAES and other state units enhance the spirit of cooperation. Despite these linkages, the dominant size of the SAES means that national priorities, planning and coordination, and even leadership, must include the SAES.

Enlarging the Capacity and Flexibility of State Units

Formula funds strengthen state research programs importantly. The research needs in each state are so great that every state constantly seeks additional resources. Unlike competitive grant funds, formula funds are continuous, allocated to all states, and under the control of the Experiment Station Director. They provide him with additional flexibility. He may use them in whatever way and for whatever purpose most likely to benefit the state. Federal formula funds provide enough resources so that even the smallest SAES can hire 2 additional scientists. Most SAES can hire from 10 to 20 additional scientists, thereby increasing their station capacity by 10-15%.

Many states do not have scientists appropriately trained to compete for non- agricultural basic research funds from NSF, NIH and other federal granting agencies. In 1987, 15 states reported no funding from NSF and 14, no funding from NIH. These states must look to other sources for additional funding.

Federal formula funds also are specially helpful to sparsely populated important agricultural states hard pressed to provided state funds in proportion to state needs. Examples are South Dakota, Idaho, Nebraska, Arkansas, and Oklahoma. Some more affluent states underinvest in agricultural research. Formula funds help make up these deficiencies. Illinois and Iowa are examples. State matching requirements for formula funds help maintain state appropriations above matching levels as in New Hampshire, Rhode Island, Vermont and West Virginia.

Appropriate Research Roles for Federal and State Governments

During the past 15 years, the importance of the federal government in agricultural research has steadily diminished.

Despite high rates of return on investment in agricultural research, public and private investments in production and food processing research are 40% under national average for U.S. industries. National concerns now center on 4 major issues requiring greater research investments.

First, who should provide the research to insure the continuing competitiveness and well-being of U.S. agriculture in domestic and world markets as competitor nations increase their investments in research and education? Who should provide the research that will enable the U.S. to protect and preserve our natural resources and the environment more effectively and yet preserve a competitive edge? Who should provide the research that ensure U.S. consumers safe, healthful and inexpensive foods in a period of heightened concern for safe foods and diets? Who should provide the research to help rural communities adjust to changes brought about by advances in technology that benefit consumers, 3 but adversely affect rural areas? Who should provide the research that explores the new scientific opportunities in molecular biology, computer-aided decision support systems and sensors and robotics and which may contribute to future international competitiveness?

If the federal government continues its policy of reduced support for research, will the independent research initiatives of 50 states provide effectively for these national needs.

Regional Coordinating Mechanism

A $30 million Regional Research Fund, part of the Hatch Appropriations, enables two or more State Agricultural Experiment Stations to plan, conduct or coordinate investigations too large for one station. USDA research agencies voluntarily participate. More than 1/3 of SAES scientists participate in these efforts to eliminate unnecessary duplication and to achieve greater efficiency in resource use.

The Nature and Origins of Formula Funding

Formula funding is required under four legislative authorities, each with a different intent: Hatch; McIntire Stennis; Animal Health, Sec.1433; and Evans-Allen. Formula funding commenced when the Hatch Act of 1887 allocated funds in equal amounts to all states and their experiment stations. From 1887 to the 1930's, new federal authorizations provided additional support for experiment stations, again in equal shares to all states. In the late 1930's, the Bankhead-Jones Act provided for additional allocations based on rural populations. The Research and Marketing Act of 1946 added farm populations and provided a Regional Research Fund. The Consolidated Hatch Act of 1955 brought all these funding authorities together and adopted the formula of the Research and Marketing Act.

The McIntire Stennis Act, in support of forestry research; and the National Agricultural Research, Extension, and Teaching Policy Act of 1977 as later amended, in support of research in veterinary medicine and for the 1890 institutions, established new formulas appropriate to those research concerns. Each formula attempts to divide funds among state units in a rational way so as to maximize the effectiveness of the federal funds for that intent. Each formula is different and involves different assumptions. Three of the 4 formulas require matching funds be provided from nonfederal resources by the recipient. Only the Evans-Allen authority does not require matching. All authorities permit the state units to manage the funds as they deem appropriate, subject only to review by the USDA for adherence to legislative intent and federal accounting requirements.

Other Funding Options

Other funding mechanisms are available to the federal government. One proposed several times in the past 20 years is to discontinue formula funding. Another provides funds for competitive grants either targeted specifically for cooperating state units or open to all institutions. Another increases"farming out" of research by USDA research agencies through contract, grants, and cooperative agreements. Each of these mechanisms shifts decision making back to the federal government, decreases the flexibility of state administrators to change state programs, and reduces the actual funds for research through additional indirect costs.

Current Uses of Formula Funds

Current uses of formula funds are summarized nationally by research problem areas and fund source in attached Table IV. As an example, note that Hatch/RRF funds are heavily used to improve efficiency of crop and livestock production and to protect crops and livestock. New and improved crop and livestock products and new uses also receive important consideration. The SAES invest just under one SY per state in exploring new crops. Detailed summaries are available by state and region.

Selected Examples of Current Research on Alternative Crops and New Uses of Farm Products

Last week in response to your request for examples of current research on alternative crops and new uses, I asked my state directors to identify a few highlights from their states. The state reports at that meeting follow:

South Dakota

Purple prairie coneflower produces an oil (its own insecticide) that provides resistance to most insects including insects common to sunflowers. The oil is being characterized with the hope that the gene controlling it can be transferred to sunflowers.

North Dakota

Specially bred sunflower hybrids produce a red dye that could replace current red dye sources thought to have mutagenic, carcinogenic and teratogenic properties. In a joint venture with a private company, the North Dakota station is seeking to test the safety and suitability of the dye in a market with $7 million annual potential.

Nebraska

The cholesterol in egg products has been removed by supercritical extraction with CO2. Biodegradable plastic foams made from 60% corn starch & 40% polyurethane will be used for food containers, drinking cups, and packing materials. A Nebraska manufacturing industry is starting up to produce milkweed floss to mix with goose down as insulation in clothing and blankets. Home economics researchers are establishing absorption and insulation qualities of the floss.

Kansas

Modified wheat starch improves the microwaveability of fruit pies and is now being produced by a local company. New hard white winter wheats produce higher flour yields, protein content, and more palatable breads than hard red winter wheat.

Indiana

An annual artemisia grown in China for medicinal purposes and in Europe for flavoring is being bred to produce greater quantities of artemisinin, an antimalarial drug. Essential oils of the same plant are being characterized for new aromas. Specialty melons have been tested and now are marketed in limited quantities. An agronomist has been developing corn lines with special starches that have great industrial potential. An industry contract has been signed for the product.

Missouri

Missouri has an 11 person research group working on degradable plastics, acetic acid, and ethanol--all from corn.

Missouri, Kansas, Iowa, Nebraska, North Dakota, Illinois and Idaho are part of a 7-state effort with crambe/rapeseed. Rapeseed includes both high erucic acid oil (industrial feedstock) and low acid (food grade canola). Canola offers quickest payoff. Illinois had 12,000 acres in 88-89 and the Missouri-Arkansas-Tennessee triangle had 4,800 acres. Crambe looks most promising in Iowa, Nebraska, and North Dakota. Missouri also is involved with 3 commercial concerns in an improved transmission fluid, polymers for auto parts, and films for plastics to keep them from sticking.

NATIONAL TOTAL SAES - OTHER INSTITUTIONS

TABLE IV-9 SUMMARY BY PROBLEM AREA OF 1987 FUNDS BY SOURCE

-- IN THOUSANDS OF DOLLARS

CLASSIFICATION CATEGORY	NO OF PROJ	----STAFF---- SUPPORT SYS	YRS OTHER	HATC /RRF	MCIN STEN	SP GT	COMP GT	EVNS ALLN	ANML HLTH	OTH CSRS	TOTAL CSRS	USDA COCA	OTH FED	STATE APPRO	PROD SALE	IND -TRY	OTH -ER	TOTAL
SERIES 100																		
101 APPRAIS OF SOIL RESO	230	70.9	221.0	1304	38	36	52	0	0	0	1430	790	1302	7265	433	1159	1981	14360
102 SOIL PLNT WTR NUTRI	690	289.0	[illegible]	5319	643	515	177	616	0	0	7270	2099	5311	27713	2251	3211	3942	51797
103 MGMT OF SALINE SOILS	81	10.0	81.9	306	2	6	1	0	0	0	315	41	169	2921	88	392	57	3982
104 ALTRNE USE OF LAND	153	33.9	77.2	582	26	381	0	37	0	0	1026	211	381	2674	69	90	700	5152
105 CONSERV USE OF WATER	339	97.5	270.6	1616	110	101	11	210	0	41	2090	488	1075	9011	564	1000	919	15180
106 DRAIN AND IRRIGATION	150	55.3	110.0	868	2	125	0	0	0	0	995	200	204	4562	793	967	2632	9184
107 WATERSHED PROT & MGM	160	51.6	136.0	825	264	269	0	41	0	0	1399	690	801	4335	353	455	974	9007
108 ECON LEG PROB OF NAT	72	21.0	45.3	273	0	0	0	0	0	0	273	130	376	1760	25	101	69	2734
109 WEATHER ADAPT & MOD	160	55.1	124.4	954	45	44	1	110	0	0	1154	330	2401	3761	136	140	677	8599
110 APPRAIS FORST & RANG	143	40.0	80.5	207	599	12	0	73	0	0	891	112	1599	2523	178	137	453	5893
111 BIOL CULT MGMT FORST	490	109.6	391.2	235	2958	107	675	57	0	0	4031	2470	1260	13365	737	2201	1641	25772
112 IMPROV RANGE RESOR	195	67.2	150.0	1079	98	205	0	20	0	0	1443	99	1221	6280	815	191	302	10351
113 REMOTE SENSING	77	16.9	50.7	177	117	4	0	71	0	0	369	67	749	1620	55	104	220	3197
114 RSCH ON MGMT OF RSCH	55	50.1	161.5	831	23	64	0	0	0	0	918	104	91	7787	235	427	75	9638
SUBTOTAL		1029.6	2887.0	10576	4921	1909	916	1239	0	41	23602	7919	17098	95556	6133	9094	14364	174560
SERIES 200																		
201 CNTRL FORST INSECTS	182	44.2	115.3	569	766	30	1163	0	0	71	2599	524	414	3630	163	137	339	7805
202 CONTROL FOREST DIS	100	34.2	70.1	462	664	4	239	0	0	0	1370	331	105	2764	31	279	290	5169
203 FOREST FIRE PROTECT	16	3.9	7.2	3	53	0	0	0	0	0	56	33	92	293	0	5	56	535
204 CNTR PESTS FRT & VEG	400	100.2	520.6	3058	0	1009	162	134	0	0	4363	391	1117	15746	900	1744	1108	25060
205 CNTR DISS FRT & VEG	738	237.9	700.0	4576	14	1755	120	110	0	156	6730	1307	1026	26279	860	2843	1575	40620
206 CNTR WEEDS FRT & VEG	172	37.0	123.0	917	0	142	0	198	0	0	1257	86	266	4360	177	516	178	6839
207 CNTR PESTS FLD CROPS	652	206.0	664.7	4691	0	1225	592	488	0	0	6996	973	1796	19366	956	2545	1534	34166
208 CNTR DIS FIELD CROPS	710	225.6	702.7	4746	0	1221	475	64	0	0	6505	764	1991	22970	695	3222	2694	38841
209 CNTR WEEDS FLD CROPS	339	115.2	377.7	2821	0	273	67	41	0	1	3203	603	507	11725	850	3110	1502	21695
210 CONTR PESTS ANIMALS	162	41.9	122.2	926	11	234	15	0	267	0	1453	129	282	3715	303	370	303	6602
211 CONTR DIS ANIMALS	1330	556.7	1740.2	4422	7	3564	2195	315	3301	29	13832	1892	15911	56058	7230	5346	8754	109631
212 CNTR INTRN PARASITES	121	36.6	101.0	788	0	235	70	0	98	0	1191	57	247	3570	328	549	312	6253
213 PROT ANMLS FROM TOXI	142	81.0	229.1	583	0	109	131	19	334	0	1176	51	6039	4468	1569	680	1913	15896
214 PROTECT FROM POLLUTI	235	88.2	280.0	1211	255	670	84	226	37	0	2483	1257	6249	7060	210	830	1105	19202
SUBTOTAL		1849.3	5047.0	29772	1770	10472	5221	1594	4038	256	53224	8398	36120	182003	14118	22192	21742	338597
SERIES 300																		
301 GENET BREED FORST TR	115	45.1	107.3	169	750	2	292	42	0	0	1255	291	666	3830	44	1328	889	8303
302 IMP FOREST ENG SYS	53	19.4	40.6	38	267	528	205	0	0	213	1250	95	69	1529	33	122	210	3308
303 ECON TIMBER PRODUCTS	77	22.4	56.1	35	537	85	0	0	0	0	657	151	70	2062	56	177	209	4184
304 IMP BIO EFF FRT & VE	1027	353.2	1259.0	7313	0	1328	913	1671	0	35	11260	1200	1799	41662	2092	3204	2307	63644
305 MECH PRCD FRT & VEGS	92	22.2	64.4	774	0	5	0	0	0	0	779	31	88	3053	60	307	102	4416
306 PROD MGMT SYS F & V	120	23.2	80.1	464	0	261	0	64	0	0	789	37	86	2493	149	500	102	4163
307 IMP BIO EFF FLD CRP	1396	555.3	1937.0	11147	0	734	3030	1270	0	1	16182	2244	5932	62201	6695	8153	4884	106290
308 MECH PROD FIELD CROP	100	29.7	70.9	715	0	56	0	0	0	0	771	60	98	3232	103	270	238	4772
309 PROD MGMT SYS FLD CR	376	91.0	252.4	1935	0	180	1	56	0	0	2172	263	271	9300	1123	933	649	14792
310 ANIMAL REPRODUCTION	570	207.4	937.7	5669	0	388	1994	816	385	0	9252	1417	5276	27452	6648	2004	1230	53278
311 IMP BIO EFF ANML PR	1241	482.0	2384.0	14376	0	318	1452	3003	471	0	19661	1810	5024	60498	20708	6607	4951	120059
312 ENV STRESS IN ANML P	196	56.7	201.1	1545	0	19	115	222	25	0	1926	24	1030	6273	1181	470	263	11166
313 PROD MGMT SYS ANML P	298	64.6	208.0	1967	0	79	0	32	16	0	2094	110	33	9247	2800	337	769	15390
314 BEES OTH POLLNTNG IN	38	10.7	29.9	107	0	27	30	28	0	0	192	46	88	1320	192	83	39	1959
315 IMP STRUC FARM SUPP	105	40.2	132.3	877	0	0	18	0	0	0	894	152	149	4121	433	464	406	6620
316 FARM BUSINESS MGMT	165	67.2	139.2	1314	0	55	0	370	0	0	1738	279	156	4686	279	134	410	7644
317 MECH/STRUCTS ANML PR	36	6.4	19.1	196	0	0	0	0	0	0	196	0	0	918	81	52	101	1309
318 RCH CON BIO TECH/BIO	1537	500.7	1995.7	6865	82	304	10306	111	7	220	17894	2135	30945	49822	2727	6314	3991	113828
SUBTOTAL		2677.5	9995.5	55466	1635	4371	10335	7726	903	469	88925	10353	52567	302545	45402	31545	21785	553123
SERIES 400																		
401 NEW IMP FOREST PROD	223	107.7	249.5	155	1277	1521	884	0	0	2	3839	602	743	9036	171	2103	1723	18205
402 PROD F & V IMP ACCEP	279	54.2	183.5	948	0	435	0	282	0	0	1665	190	323	6678	283	689	436	10264
403 NEW & IMP F & V PROD	173	53.5	177.7	979	0	109	0	171	0	0	1259	43	199	5952	966	842	511	9771
404 MNT QUAL FRTS & VEGS	167	57.9	170.4	1467	0	155	0	47	0	0	1669	41	64	6296	177	773	421	9390
405 PROD FLD CROP IMP AC	270	99.3	361.6	1850	0	139	52	150	0	0	2191	650	2607	8750	615	1907	1501	18310
406 NEW IMP FOOD FLD CRO	120	41.9	140.4	863	0	0	0	128	0	0	991	85	784	3778	225	650	817	7329
407 NEW IMP NON FOOD FC	78	29.1	106.4	533	0	248	0	9	0	2	792	43	239	2731	263	363	370	4802
408 MNT QUAL FIELD CROPS	82	23.7	60.1	619	0	1	0	27	0	0	646	8	330	2344	38	359	107	3832
409 PROD ANML PR IMP ACC	157	44.1	171.0	1356	0	277	22	183	3	0	1841	217	283	5374	1221	829	463	10229
410 IMP MEAT MILK EGG PR	244	84.9	329.1	2168	0	1	90	270	5	0	2532	180	549	8143	1015	1727	1180	15327
411 IMP NON FOOD ANML PR	18	3.7	8.0	71	27	0	0	15	0	0	113	1	6	387	11	76	20	614
412 MNT QUAL ANIMAL PROD	85	20.3	62.5	561	0	0	0	27	0	29	616	3	55	2517	61	403	157	3811
SUBTOTAL		620.2	2020.9	11569	1303	2886	1048	1308	7	33	18155	2150	6182	61927	5046	10000	7705	111165
SERIES 500																		
501 IMP GRADES & STANDS	40	10.0	27.9	342	0	90	0	0	3	0	435	42	14	823	17	170	107	1609
502 MKTG TIMBER PRODUCTS	41	8.9	15.9	40	159	79	0	0	0	0	278	217	46	527	2	62	74	1206
503 MKTG EFF AGRI PRODS	140	42.7	83.3	914	0	139	0	9	0	0	1063	159	845	2861	94	337	300	5660
506 SPLY DEMAND AND PRIC	180	60.1	133.7	1495	0	174	0	28	0	0	1697	307	175	5002	107	195	421	8035
507 COMP REL IN AGRIC	47	11.3	26.4	302	0	58	0	21	0	0	381	73	5	810	45	45	61	1420
508 DOMESTIC MKT DEVELP	52	12.5	23.6	223	0	17	0	107	0	0	347	26	22	882	33	126	188	1623
509 PERFORMANCE MKTG SYS	151	50.0	117.1	1292	0	78	0	192	0	0	1562	399	122	4306	78	157	352	6977
510 GROUP ACT MKT POWER	23	5.5	11.9	67	0	22	0	27	0	0	116	78	14	482	22	22	26	759
511 IMP AGRIC STATISTICS	32	9.0	17.3	121	0	0	0	37	0	0	158	768	49	648	10	104	118	1855
512 IMP GRADES FRST PROD	16	2.8	8.6	3	26	0	30	0	0	0	59	46	11	348	37	42	13	555
513 PRICE ANAL FRST PROD	25	5.1	11.0	64	103	0	0	0	0	0	167	165	12	337	4	26	26	738
SUBTOTAL		219.5	476.7	4862	288	657	30	422	3	0	6262	2280	1316	17074	449	1286	1687	30445
		79.6		582		304		0		0		524		4187		697		10331
SERIES 600																		
601 FGN MKT DEVELP	75	35.2	65.0	417	13	142	0	0	0	0	573	304	2309	2265	29	139	978	6637
602 EVAL FGN FOOD AID PG	3	0.7	1.2	5	0	0	0	0	0	0	5	32	3	32	0	21	0	93
603 TECH AID DEV CNTY	55	34.3	77.7	74	0	152	0	0	0	0	226	138	7235	1266	64	475	774	10178
604 FRD DVLPMT/MKTG FRGN	28	9.3	20.0	85	35	10	0	0	0	0	130	50	170	625	16	63	366	1420
SUBTOTAL			164.3		48		0		0		934		9717		109		2118	

NATIONAL TOTAL SAES - OTHER INSTITUTIONS

TABLE IV-9 SUMMARY BY PROBLEM AREA OF 1987 FUNDS BY SOURCE

IN THOUSANDS OF DOLLARS

CLASSIFICATION CATEGORY	NO OF PROJ	----STAFF---- SUPPORT SYS	YRS OTHER	HATH /RRF	MCIN STEN	SP GT	COMP GT	EVNS ALLN	ANML HLTH	OTH CSRS	TOTAL CSRS	USDA CGCA	OTH FED	STATE APPRO	PROD SALE	IND -TRY	OTH -ER	TOTAL
SERIES 700																		
701 TOX RES IN FOOD	132	53.0	132.5	1100	0	1227	0	63	11	160	2569	882	1710	3900	108	311	311	9303
702 FOOD PROT FROM TOX	176	68.7	210.2	1673	0	54	49	143	19	0	1938	128	2032	6361	187	1356	509	13291
703 FOOD CONSUMP HABITS	122	35.0	65.3	717	0	50	0	498	0	0	1265	156	371	2049	80	296	129	4345
704 HOME COMM FOOD SERV	40	8.2	19.5	387	0	0	28	27	0	0	401	0	26	751	36	32	50	1296
705 SEL CARE CLOTH & TEX	73	16.2	39.5	261	0	0	0	350	0	0	610	22	35	1283	40	61	25	2081
706 CONTR INSECTS AFF MA	107	37.0	97.3	733	24	21	15	0	0	0	793	48	449	3696	91	350	279	5707
707 TRANS ANIMAL MAN DIS	38	15.1	99.3	58	0	0	0	73	0	0	131	103	682	704	301	420	400	2789
708 HUMAN NUTRITION	392	136.1	510.1	2640	3	90	945	1467	0	0	5144	580	5231	10816	632	2007	1073	25484
709 REDUCE HAZ HLTH & SF	46	10.3	20.0	232	0	5	0	0	0	0	237	9	336	1180	20	115	59	1957
SUBTOTAL		380.4	1281.6	7760	27	1446	1036	2620	30	160	13089	1849	11673	38361	1491	4948	2083	66234
SERIES 800																		
801 RURAL HOUSING	62	12.7	29.8	230	0	0	0	384	0	0	617	1	19	805	27	31	81	1581
802 INDIV & FAM DEC MAKI	201	49.0	91.4	682	0	17	0	634	0	0	1333	15	389	3184	165	217	231	5516
803 RURAL POVERTY	27	5.9	21.2	81	0	17	0	164	0	0	261	13	9	263	47	23	10	627
804 ECON POTENT RURL RES	85	23.3	48.4	334	37	21	0	1000	0	0	1392	1	66	1105	26	13	41	2644
805 COMMUNICAT EDUC PROC	106	35.4	80.8	280	22	7	0	342	0	92	751	89	284	3101	94	88	254	4582
806 ADJUSTMENT TO CHANGE	198	57.3	120.4	1343	0	17	0	639	0	0	1999	79	523	3572	140	494	355	7161
807 AGRIC ECONOMIC CHANG	104	51.9	107.5	1043	0	100	0	260	0	0	1403	134	99	4013	126	630	584	6989
808 GOVT PROGRAMS	56	18.7	49.0	498	0	46	0	0	0	0	544	50	84	1634	36	51	386	2785
SUBTOTAL		254.3	552.5	4583	58	226	0	3423	0	92	8302	381	1472	17679	662	1508	1961	31885
SERIES 900																		
901 ALLEV POLLUTION	456	153.7	482.1	2920	100	461	0	317	0	0	3847	1262	3009	13607	363	3274	1638	27080
902 OUTDOOR RECREATION	121	30.2	68.9	355	273	0	0	0	0	0	628	274	536	2325	82	228	424	4497
903 MULTI USE FOREST POT	96	16.5	47.0	60	397	0	0	0	0	0	457	73	364	1334	85	133	303	2749
904 WLDLFE AND FISH ECOL	640	211.9	766.6	1407	890	1379	104	1181	111	0	5161	736	6888	19683	1374	2846	6961	43649
905 TREES BEAUTIFICATION	80	19.3	49.9	259	71	2	55	63	0	0	450	52	64	2045	79	267	52	3009
906 ORNAMENT & TURF DEV	529	194.5	560.3	4432	5	109	0	121	0	0	4687	206	300	22050	602	2712	1245	31801
907 RURAL INCOME IMP	104	35.4	67.8	924	15	86	0	105	0	0	1130	116	174	2293	29	141	158	4041
908 RURAL INSTITUT IMP	160	64.6	88.4	1308	0	100	0	339	0	89	1912	255	122	3109	98	97	106	5692
990 UNCLASSIFIED	2	0.0	13.0	19	0	0	0	0	0	0	19	0	354	268	0	1273	0	1914
SUBTOTAL		710.5	2112.0	11707	1000	2217	160	2127	111	89	18290	2974	11892	66714	2705	10971	10886	124432
SCIENCE IN SERV OF MAN GRAND TOTAL		7820.9	25177.9	100085	11032	26487	26066	20460	5094	1160	230780	36790	148082	778886	75306	93842	85072	1468881

South Dakota & New York Experiment Stations Compared

Item	South Dakota		New York	
1) Consumers (millions)	0.7		17.6	
2) Farm Receipts ($ millions)	3,335.3		2,708.1	
3) Research Funds ($ millions)				
Base Programs:				
State	4.6		30.1	
($/capita)		($6.53)		($1.71)
Federal Formulas	1.7		3.5	
Federal Coop.	0.5		1.3	
(added capacity-Federal)		(+47%)		(+16%)
Grant/Contract Programs				
Federal	0.6		11.3	
Other	2.9		11.9	
4) Research Jobs (FTE)	209		2,830	
5) Science Capacity (FTE)				
SAES	87		334	
USDA-ARS	9		41	
6) Research Programs (FTE)				
Natural Resources	9.9		32.9	
Forest Resources	2.4		2.4	
Crops	39.1		113.1	
Livestock	28.2		53.0	
People & Communities	0.8		36.0	
Marketing/Trade	3.2		17.9	
General/Bio Technology	0.8		45.1	
Food Science & Human Nutrition	2.3		25.4	

Senator DASCHLE. Thank you, Dr. Huston.

Dr. Scott.

STATEMENT OF NORMAN R. SCOTT, VICE PRESIDENT, RESEARCH AND ADVANCED STUDIES, CORNELL UNIVERSITY, ITHACA, NY

Dr. SCOTT. Thank you.

GOAL OF AGRICULTURAL RESEARCH

The goal of agricultural research is increased efficiency and stability of production with improved profitability for the farmer and enhanced welfare of rural communities and consumers. This utilitarian value was well captured well by a Wisconsin farmer who, about 100 years ago, offered the graphic statement, "We do not want science floating in the skies, we want to bring it down and hitch it to our plows." Thus, our objective in agricultural research is to bring science of the gene, electron, economics, and human behavior to meet the practical needs of agriculture and rural life.

I suggest in the written document several areas that are very important and where in agricultural and food research we need to focus.

HATCH ACT FUNDING

Let me just say that a century ago the leaders of agricultural research were challenged by "practical information," if you will, versus "original researches" in defining the mission of the State agricultural experiment stations. I submit that little has changed today, and, in fact, much of the debate concerning Hatch Act funding compared to competitive research funding is focused on this same argument. Since the inception of the competitive research grants program, these grants have typically focused on the "more basic" areas of agricultural research. My theses is that we must have a mix of fundamental and applied research, as Dr. Huston mentioned, if we are to truly meet the needs of the agricultural producer, rural communities, and consumers.

Specifically, New York State, composed of two agricultural experiment stations, Cornell University and the New York State agricultural experiment stations, were once funded almost 100 percent with formula funds, now receives only 7 percent of the total support for agricultural research budget—details in the prepared material (figure 2)—in the form of formula funds. So there has been a tremendous transition in the way in which agricultural research is funded in that State.

ROLE OF COMPETITIVE RESEARCH GRANTS PROGRAM

Now, I would like to address several specific questions: the role of the Competitive Research Grants Program, the Competitive Research Grants Office, known as CRGO, of the USDA. It was established in 1978 and at that time had four areas of focus. Those areas have expanded over the last 10 years to 12 areas, broadening into animals, which was not covered in the original grants, and also into biotechnology in 1985.

CRGO GRANTS IN COMPARISON WITH NIH AND NSF

One of the other things about the CRGO grants in comparison with NIH and NSF that I would like to address is the fact that the grants are typically shorter in duration and also smaller in number of dollars than the comparable grants in the NSF and the NIH. I suggest that we need to enhance the number of grants, of course, and the dollar amounts, and there are graphs (see prepared material, figures 3 and 4) which are illustrative of the number of grants that have been submitted and the success ratio, which is somewhere in the neighborhood of 20 percent. I would also suggest that the decreased number of applications during the past 3 years is due to the fact that the potential success and the rewards from the process are small and have caused negative feedback in terms of number of grants submitted to the system. But, clearly, there is a very high residual number of qualified grants that are not being funded.

WHY COMPETITIVE RESEARCH GRANTS IN THE FIRST PLACE?

The focus for the needed new agricultural research must be directed more toward the quality, safety, utility, and value of products and less toward increased food and fiber production. In order to enlist the full research capabilities existing throughout the Nation, we must participate in a process to attract the participation of all competent researchers, including, of course, those from the land-grant institutions. In order to take full advantage of advances in modern biology and physical sciences, we need the input of the many nonland-grant institutions which can contribute their expertise to a new strategy for agricultural research.

PROGRAMS ARE NEEDED

But in addition to those 12 areas that are now funded by the Competitive Grants Program, there are a number—and I would like to indicate at least some—that should be added to the list and are needed: Agroecosystems; alternative systems, which the chairman mentioned in his opening remarks; food safety; water quality and management; soil productivity; engineering in many forms as it relates to agriculture; toxicology; economics; and sociology. By mentioning these, I have certainly not exhausted important areas that are not now included in the Competitive Grants Program but need to be.

UAB 1990 REPORT

In fact, the Users Advisory Board in its 1990 report to the President and Congress states in supporting the proposed 1990 budget for the Cooperative State Research Service (CSRS): "The Users Advisory Board's key recommendation calls for increasing emphasis to be placed on competitive research grant programs. Such programs offer great potential for attracting the Nation's most outstanding scientists."

ADDITIONAL REASON FOR COMPETITIVE GRANTS

I think there is another additional reason for competitive grants in terms of the agricultural sciences. For far too long, although agricultural science has been outstanding, it has not received the proper recognition of the larger science community and NSF and NIH. I feel that in the competitive grants approach, by capturing faculty in the universities from nonagricultural programs and their working together with agricultural sciences, this program will provide an opportunity for greater recognition and a more equal status.

WHO BENEFITS FROM COMPETITIVE GRANTS?

I have given examples of five specific projects in New York because of better knowledge of these.

TRANSFER OF GENES; INSECT SEX PHEROMONES; NUTRIENT PARTITIONING IN ANIMALS; PATHOGENICITY GENES IN PLANTS; EXTENDED SHELF LIFE OF TOMATOES

We have developed a technique for transfer of genes, a "gene gun" that was developed with the support of the Competitive Grants Program; a project for controlling pests through sex pheromones, which was developed from a basic understanding; nutrient partitioning in animals, the bST story; pathogenicity of genes in terms of understanding how to design resistant plants; and extended shelf life of tomatoes. All very practical examples of agricultural research which have been funded with the competitive grants funds.

WHICH SCHOOLS HAVE BEEN SUCCESSFUL?

Some data exists (figures 6–8), and, clearly, New York and California—California first and New York second—have been big winners, if you will. And, in fact, in terms of the total funding of not only agricultural research, but science research, these two States and the Midwest have been big winners in that sense.

CAN SMALL SCHOOLS BE SUCCESSFUL?

But I suggest small schools can be successful, and I would like to suggest three answers to the question: Can small schools be successful?

First, smaller schools cannot compete across the whole arena of competitive grants but must focus in areas of comparative advantage. In the smaller land-grant institutions, colleges of agriculture are already being forced to compete for scarce resources. So this is nothing new. And having had an opportunity to visit South Dakota in January, when it wasn't such an opportunity from a weather point of view, to talk with scientists out there relative to the bioenvironmental stress laboratory, there is a focus at that South Dakota State University to put scientists together and look at a specific problem area, and together with scientists also in other parts of that same region, to develop a focus which would be competitive. So focusing by the small institution.

Second, smaller institutions need to develop enhanced linkages with larger and other institutions within their region. By developing a strong scientific focus, they can be competitive in their linkages with other institutions.

Senator DASCHLE. Let me ask you to summarize if you could, Dr. Scott.

Dr. SCOTT. OK. I will.

The third answer to the question of "can small schools be successful?" I would like to say in terms of that particular comment is to increase the focus on strengthening smaller institutions within the CRGO program. The NSF model of EPSCOR (Experimental Program to Stimulate Competitive Research) and it is an excellent example. That's another facet that could be included within the CRGO program which would be used to strengthen the smaller institutions.

WHAT IS THE FUTURE OF COMPETITIVE GRANTS?

It seems to me that it is difficult in an era of increased global competition in agriculture not to expect competitive efforts within agricultural research. So because of the importance of agriculture and the need for agriculture research to ensure competitiveness, the Competitive Research Grant approach is one way of ensuring that the best scientists will be brought together to focus on important research.

Thank you.

[The prepared statement and attachments of Dr. Scott follow:]

STATEMENT TO THE SENATE SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION

JULY 27, 1989

By Dr. Norman R. Scott
Vice President for Research
and Advanced Studies
Cornell University
Ithaca, NY 14853

Agricultural Consumers on the average now spend approximately 14.4 percent of their disposable income on food, an all time low. Business Week, in its May 4, 1989 edition, referred to our food system as "America's supermarket miracle" and to supermarkets as "A national food exhibition". Agricultural research, involving a unique partnership of federal, state, and private cooperation has been the major contributor to this revolution.

The goal of agricultural research is increased efficiency and stability of production with improved profitability for the farmer and enhanced welfare of rural communities and consumers. This utilitarian value was captured well by a Wisconsin farmer almost one hundred years ago who offered the graphic statement, "We do not want science floating in the skies, we want to bring it down and hitch it to our plows." Thus, our objective in agricultural research is to bring science of the gene, electron, economics, and human behavior to meet the practical needs of agriculture and rural life. As we look to the future, I suggest that the agricultural research agenda must include:

- Water quality and management
- Expanded biotechnological advances in plant and animal systems
- Emphasis on improved nutritional value and quality of crops and livestock products
- Greater emphasis on food safety for protection of human health
- Expanded uses of agricultural products for both food and non-food applications
- Low input or alternative systems to improve profitability
- More resource-and energy-sparing technologies
- Bioprocessing of agricultural products for storage, packaging, and distribution

- Enhanced crop protection through integrated crop management strategies, including integrated pest management (IPM) and biological control
- Enhancing and maintaining soil productivity
- Electronic sensors, including robotics and microcomputing, for systems management
- New systems for aquaculture
- Global economic policies for a more competitive trade position in international markets
- Rural community development for enhanced social well-being
- Improved utilization and efficiency of local labor markets

The Hatch Act has been a central force in the development of an agricultural research system with an applied orientation which is both geographically and administratively decentralized. Today, as at the time of the signing of the Hatch Act, agricultural science is in the midst of a debate concerning expectations of researchers, funding sources, and administrators. A century ago the challenge for leaders of agricultural research was to build a system consistent with conflicting goals and diverse values. Today we face a similar need to address differences in values and to revitalize the system to meet competing concerns of a new set of political interests and yet maintain the scientific strengths inherent in the Hatch Act.

During the debate, at the time and following the passage of the Hatch Act, individuals focused on "practical information" versus "original researches" in defining the mission of the state agricultural experiment stations. I submit that little has changed and, in fact, much of the debate concerning Hatch Act funding compared to competitive research funding is focused on this same argument. Since the inception of the Competitive research grants program, these grants have typically focused on the "more basic" areas of agricultural research. My theses is that we must have a mix of fundamental and applied research if we are to meet the needs of the agricultural producer, rural communities, and consumers.

Hatch Formula Funding

Although it is not my purpose today to address in detail Hatch formula funding, I do not want to bypass an opportunity to emphasize my argument that we need a balance of formula funds and competitive grants. The federal funds which are allocated yearly to each state agricultural experiment station (SAES), matched by state support, as provided in the Hatch Act of 1887, are typically referred to as "base" funds because they provide the foundation on which other sources of funding for agricultural research are added. The continuing base programs of the SAESs provide sources of funds to respond rapidly to changes, provide stability, support young scientists, leverage additional funding, bridge external funding, and pursue new initiatives. At the Cornell University Agricultural Experiment Station and the New York State Agricultural Experiment Station, the use of Hatch funds range widely from application of basic sciences to adaptive research.

Although Hatch funding of agricultural research was a major source at the beginning of the century, it now represents at most agricultural experiment stations a relatively small fraction. As Figure 1 shows, the ten year funding history of Hatch formula funds has been level (actually for two years less) over the past five years in terms of actual dollars, but a declining resource in terms of 1979 constant dollars. For example, at both the Cornell University and New York State Agricultural Experiment Stations, formula funds represent a relatively small fraction (approximately 7 percent) of total support for agricultural research (Figure 2). Although Hatch funding has moved from the primary source of funding at the beginning of century to a lesser position now, it is an extremely important source for base funding of agricultural research.

I also want to add a very important fact, no formula funding is used to support faculty salaries at Cornell. The formula funds are allocated to support specific projects with faculty members serving as principal investigators. Funds are primarily used within projects for research support staff (graduate students, post-docs, support specialists, and technicians), equipment, supplies, and general research expenses.

Role of Competitive Research Grants

The concept of competitive research grants has become common in the United States beginning with the National Science Foundation (NSF) and the National Institutes of Health (NIH). The USDA Competitive Research Grants Office (CRGO) was established in 1978 to implement a section of the Food and Agriculture Act of 1977. The objective of CRGO is to award competitive grants in high priority research areas seeking the widest participation of qualified scientists. Also, it is a mission of CRGO to promote long-term, high risk, fundamental research in agriculture. Proposals are solicited from all segments of the U.S. scientific community, including Land Grant colleges/universities, public and private colleges/universities, public and private research institutions, profit-making organizations, and individuals. The selection of awards is based on the evaluation by a peer review process. The CRGO is the only program within the USDA that supports investigator initiated individual research projects in a totally competitive fashion that is open to scientists at non-agricultural institutions as well as scientists at traditional agricultural institutions and whose expressed purpose is to support long-term basic research.

In 1978 grants were made to support basic research in four areas of plant science: nitrogen fixation, photosynthesis, biological stress on plants, and genetic mechanisms for improvement of crops. Since its beginning, twelve areas of research are currently addressed:

- biological and environmental stress on plants
- biological and environmental stress on animals
- photosynthesis
- biological nitrogen fixation and metabolism
- plant genetics and molecular biology
- animal genetics and molecular biology
- plant growth and development
- animal growth and development
- animal reproduction
- insect pest sciences
- alcohol fuels research
- human nutrient requirements

The number of competitive research applications and grants is traced in Figure 3. The significant increase in applications and grants during Fiscal 1985 represents the initiation of the program in biotechnology. The average success rate, defined as number of awards divided by number of applications, has been around 22 percent. However, it is important to point out that successful proposals receive only about one-half of what is requested. A typical CRGO grant is $110,000 for two years, including indirect costs. This is about one-half the average of an NSF grant ($225,000 per three years, including indirect costs). An average NIH grant for basic research is $100,000 per year, direct cost for 3-5 years. Figure 4 illustrates the requested amounts by proposals and the available funds in the CRGO. It might be suggested that the decline in the number of proposals submitted after 1985 is a result of the low success ratio; the competition is very stiff and the rewards are fairly small.

At the initiation of the competitive grants program, many expressed concern that the proposals would shift from the Land Grant universities, the traditional sites of research in agricultural sciences. There was a fear that this would tend to fund basic biological research without a relevance and connection to the agricultural sciences. However, approximately 60-70 percent of the grants go to Land Grant colleges and universities (Figure 5).

Why Competitive Research Grants?

The focus for the needed new agricultural research must be directed more towards the quality, safety, utility, and value of products and less towards increased food and fibre production. In order to enlist the full research capabilities existing throughout the nation, we must participate in a process to attract the participation of all competent researchers, including of course those from the Land Grant institutions. In order to take full advantage of advances in modern biology and physical sciences, we need the input from many non-Land Grant Institutions which can contribute their expertise to a new strategy for agricultural research.

As clearly indicated in Figures 3 and 4, there is already a residual expertise not being utilized because of the very limited funding. In addition, programs are needed at least in the areas of:

- Agroecosystems
- Alternative systems
- Food Safety
- Water quality and management
- Soil productivity
- Engineering in many forms as it relates to agriculture
- Toxicology
- Economics
- Sociology

The report of the Users Advisory Board 1990 to the President and Congress states in supporting the proposed 1990 budget for the Cooperative State Research Service (CSRS) . . "The UAB's key recommendation calls for increasing emphasis to be placed on competitive research grant programs. Such programs offer great potential for attracting the nation's most outstanding scientists . ." The UAB report goes on to recommend new competitive research grants for food safety, proposes the shift of animal health research from special grants to competitive research grants, and suggests that Plant Science and Plant Science Centers be combined into one line item. I strongly support these recommendations.

An additional reason for the competitive grants program is that this program puts research in the agricultural sciences on a par with the well accepted processes of NSF and NIH. For far too long agricultural research has not received proper recognition for the quality of its science. Getting non-Land Grant scientists working on agriculturally related problems with agricultural scientists will enhance the stature of agricultural research and enhance its rightful recognition as an equal in the scientific research arena.

Who Benefits From Competitive Grants?

The benefits of basic aspects of the competitive grants program spill over into the more applied areas of research and extension. The CRGO Program has provided major resources for the education of graduate students and has been a stimulus in recruiting young, top quality scientists into agricultural research. The nation's farmers, consumers, and rural communities all benefit from this basic research. The farmer benefits from greater efficiencies and stability of production systems leading to increased profitability because U.S. agriculture is more cost effective and thus more competitive in the world market. Consumers benefit through improved quality and purity of the U.S. food supply. Rural communities will profit from enhanced economic development opportunities as a result of a healthy, diversified, and competitive food and agriculture system.

At this point, however, let's move to some specific examples of accomplishments from the competitive grants program. I hope that you will accept my apologies for referring to Cornell research, but it is research with which I am most familiar and with which I can speak with greatest knowledge.

- ***Transfer of Genes.*** An excellent example of an interdisciplinary project is the development of the "gene gun". This unique device for transferring DNA through the cell wall is the creation of a horticulturalist and an electrical engineer. Tiny tungsten spheres (approximately 1 micron in diameter) coated with DNA are fired via a ballistics approach using a 22 gauge shell to provide the impetus "to shoot" these tiny spheres into the plant or animal cell. The gene gun will serve as a principal technique for transfer of agriculturally import genes in the recently designated Plant Science Research Center at Cornell. Although supported specifically by the National Science Foundation, the Plant Science Research Center is part of the three-way agency agreement between USDA, NSF, and DOE for support of Plant Science Centers. The gene gun promises to be a significant technique for transfer of genetic material in agriculture and is expected to be a major technique for gene transfer in both university and industrial laboratories around the nation.

- ***Insect Sex Pheromones.*** Culminating 20 years of effort initiated by Cornell entomologists, a pheromone product, Shin-Etsu pheromone tie, has been demonstrated to provide commercially acceptable control of the most important insect pest of New York grapes, the grape berrymoth. The product is an environmentally safe, non-toxic alternative to the three toxic insecticide sprays used by many New

York grape growers to control this pest. Pioneering work in the early 1970's, also supported later by competitive grants, identified the minute amount of chemicals emitted by female grape berrymoths that attract male moths. Field studies have resulted in demonstration of the effectiveness of this alternative to pesticides. Over a hundred acres of New York vineyards were treated with the pheromone product in 1988 and, in all cases, the pheromone gave control of grape berrymoths equivalent to vineyards treated with conventional toxic insecticides. It is anticipated that the heightened public concern with pesticide use in grapes and the tightening of government regulations regarding pesticide use in New York will provide growers with strong incentives to utilize this new pest control technology.

- ***Nutrient Partitioning in Animals.*** As animal scientists sought to unlock the secrets behind the partitioning of nutrients within the dairy animal, the practical implication has become the bovine somatotropin (bST) story. Scientists were looking for an explanation of why some cows produced more milk given a fixed nutrient intake. They determined that bST was a hormone that affected the higher production. This, of course, has led to the raging controversy over the utilization of daily administered bST for enhanced milk production in the dairy cow. Laying aside for the moment the social, economic, and political consequences of bST, it is likely that bST can lead to increased efficiencies of production in the dairy industry.

- ***Pathogenicity Genes in Plants.*** Plant pathologists have identified and cloned "pathogenicity genes" in plant pathogenic fungi. This is a major breakthrough in understanding how pathogenic fungi overcome the natural resistance barriers present in most plants. The newly identified genes act by synthesizing an enzyme that detoxifies phytoalexin, a major chemical in plants which inactivates invading bacteria and fungi. This result has important implications for biocontrol of weeds (using fungi as biocontrol agents), for studies on the basic pathogenicity, and for the construction of resistant plants.

- ***Extended Shelf Life of Tomatoes.*** Biochemical clues from an obscure Brazilian tomato have led plant biologists to a treatment that doubles the amount of time ripe tomatoes retain top eating and storage quality. The infusion of a "polyamine" or "methionine" into the fruit extends the keeping quality of tomatoes. The inexpensive process can extend the shelf life of vine ripened flavor tomatoes from 4-5 days to 10-12 days. This process can have an enormous impact because it offers processors and shippers enough time to market the ripened tomato and allows supermarket operators to hold ripe tomatoes in top condition until sold.

Which Schools Have Been Successful?

Figure 6 provides a revealing list of the number of grants awarded by CRGO from 1978-1988. California and New York are the biggest "winners". The midwestern farm states are also recipients of a significant number of competitive research grants. An additional picture of competitiveness in the larger research arena is given in Figure 7. None of the traditional Land Grant universities make the top 10 list of NIH, but 4 Land Grants are among the top 10 funded institutions of the NSF. On the basis of funds awarded by CRGO in fiscal 1987, 6 of the top 10 institutions are from the midwest with UC Davis, Cornell University, North Carolina State, and UC Berkeley representing institutions outside of the midwest.

I have attempted to provide a picture of USDA Competitive Grants awarded to Cornell University (Figure 8) since 1981 (for those program areas in existence since 1981). On the basis that Cornell has received about $4 million per year from federal formula funds, I project that during this period Cornell has obtained from USDA competitive grants annually approximately one-half to three-quarters of the amount received from formula funds.

What is the "secret" of success at Cornell in the competition for CRGO grants and research funds in general? I think there are five important reasons:

- Attraction and hiring of superb, young faculty
- An excellent mix of fundamental and applied research
- Low barriers to interdisciplinary work
- A broad funding base with a focus on seeking matching funds from industry and commodity groups
- Excellent interactions between biological and agricultural scientists (approximately one-half of the Division of Biological Sciences is housed within the College of Agriculture and Life Sciences).

Can Small Schools Be Successful?

Given the apparent and predominant success in the competitive grants of the larger institutions, it is frequently asked, can smaller schools be successful in the competitive grants program? It seems to me there are three answers to this question:

- Smaller schools cannot compete across the whole arena of competitive grants but must focus in areas of comparative advantage. In the smaller Land Grant institutions, Colleges of Agriculture are already being forced to compete for scarce resources. For this reason and for the need to be competitive in the area of CRGO, smaller institutions must develop focused expertise.
- Smaller institutions need to develop enhanced linkages with larger and other institutions within their region. By developing a strong scientific focus and seeking to develop linkages with other institutions, it is possible to build consortia which will be competitive.
- Develop increased focus within the CRGO program to provide research strengthening grants to smaller institutions. An additional criteria in the CRGO program might be some attention to geographical distribution much like NSF follows in its criteria for research awards. The NSF model of EPSCOR (Experimental Program to Stimulate Competitive Research) is an excellent example.

Alternative Crops and Products

Specific funding for alternative crops and products has not been a focal area within the competitive grants program. This is another area, as mentioned earlier, that is important to US agriculture and which deserves serious consideration for a competitive grants initiative. I would like to dwell a moment on two alternative systems researched with formula fund, state, and industrial support.

Domestic production and harvest of fish and shellfish is not expanding fast enough to satisfy consumers' increased demand. In addition to the rapidly growing pond culture in the southeast, there are other innovative approaches. A Cornell task force representing disciplines of natural resources, agricultural and biological engineering, food science, nutritional sciences, veterinary medicine, agricultural economics, and aquatic sciences has developed an integrated rearing system for brook trout and Atlantic salmon. A 100 percent reuse system has been designed and tested for growing brook trout and Atlantic salmon from fingerling size. The system encompasses a modular design with a production capacity of about 5000 lbs. of trout or salmon per year per module. . The production systems developed at Cornell have proved to be successful in maintaining excellent fish health, good growth rate, and a high quality product which is acceptable to the consumer. Initial marketing studies through a retail food outlet have shown the fish grown in these modular units to be excellent. Results from the research have been applied to several commercial growing operations in New York.

Another task force at Cornell of veterinarians, animal scientists, agronomists, agricultural economists, agricultural and biological engineers and representatives from the food and agricultural industry has concentrated on a sheep/lamb rearing enterprise. The mission is directed at utilizing New York's agricultural resources to economically produce a marketable consumer product that is in deficient supply. A specific management system called the "STAR" has been developed to increase the efficiency and profitability of producing lambs year round.

Consistent with a research focus, a farming alternatives project has been developed and a guide prepared. The guide to evaluating the feasibility of new farm-based enterprises focuses on the business planning, marketing, and management issues involved in developing any new or non-traditional farm-based enterprise. It is designed to be helpful for those considering non-traditional enterprises such as:

- Non-traditional crops, livestock, and other farm products
- Service, recreation, tourism, food processing, forest/woodlot, and other enterprises based on farm and natural resources
- Unconventional production systems such as organic farming or aquaculture
- Direct marketing and other entrepreneurial marketing strategies

What is the Future of Competitive Grants?

It is difficult to believe that in a era of increased global competition in agriculture overall that increased competition will not be expected in the conduct of agricultural research. Because of the importance of agriculture to the national economy and the need for agricultural research to ensure our competitiveness in the global arena, there should be a significant increase in funding of competitive research grants. The benefits of agricultural research have been documented many times over. Figure 9 illustrates that on the average the benefit cost ratio of agricultural research is $2.68 per tax dollar invested in agricultural research. Now is the time to develop a new thrust in the support of agricultural research. To do less will put this nation at a significant disadvantage in meeting the global challenge. It is important to reemphasize again that this strategy requires a balance between competitive grants and formula funds.

10 YEAR CSRS/SAES FUNDING HISTORY, 1979-88
Hatch Formula Funds

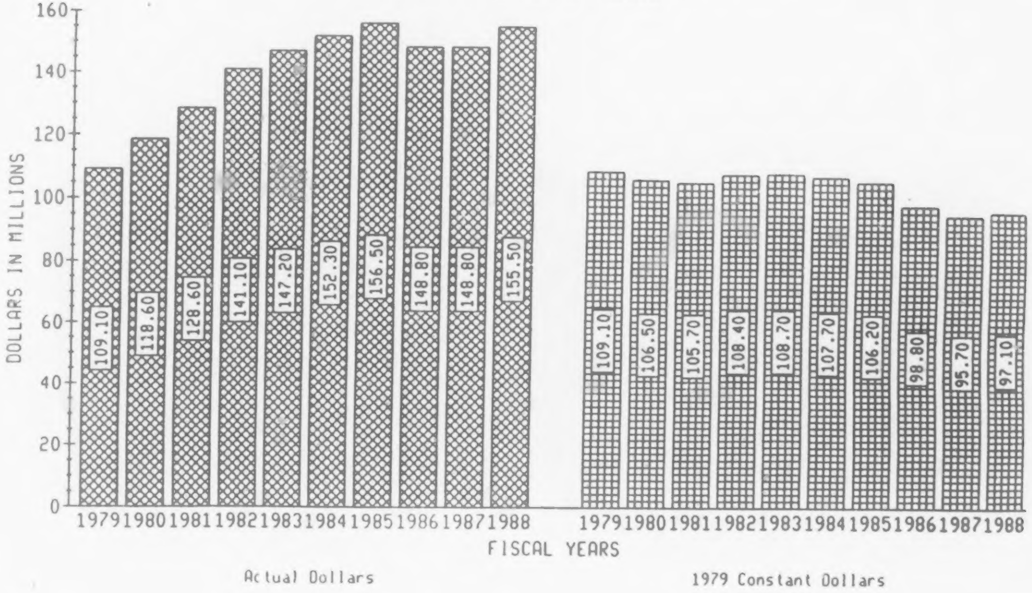


Figure 1

TOTAL FUNDS AG. RESEARCH
CORNELL UNIVERSITY

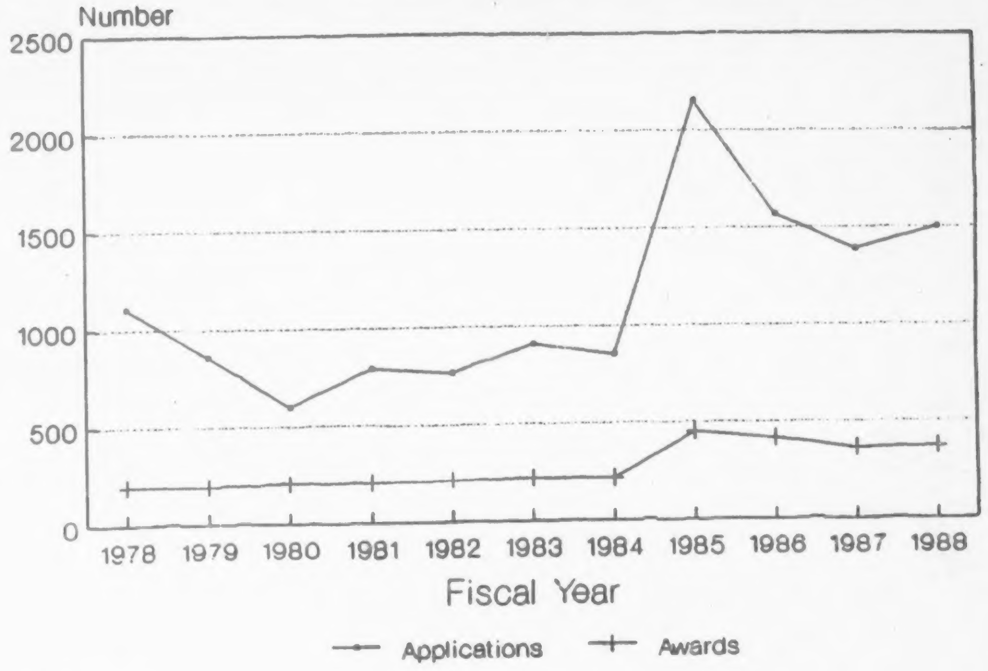
(CORNELL UNIVERSITY AGRIC. EXP. STATION)
(NEW YORK STATE AGRIC. EXP. STATION)
JULY 1, 1987 - JUNE 30, 1988

SOURCE OF SUPPORT		1987-88
USDA FORMULA FUNDS		$4,133,326
(Hatch, Regional Research and McIntire Stennis)		
USDA GRANTS		$3,076,992
(Competitive Grants, Special Grants, Contracts, and Coop Agreements)		
OTHER FEDERAL GRANTS & CONTRACTS		$9,103,878
(NSF, NIH, DOE, EPA, DOI, ETC.)		
INDUSTRY, FOUNDATION, PRIVATE GIFTS		$9,113,913
COLLEGE FUNDS		$7,102,520
STATE FUNDS		$25,803,287
NYS Appropriated	$22,546,269	
State Grants & Contracts	$3,257,018	

	TOTAL	$58,333,917

FIGURE 2.

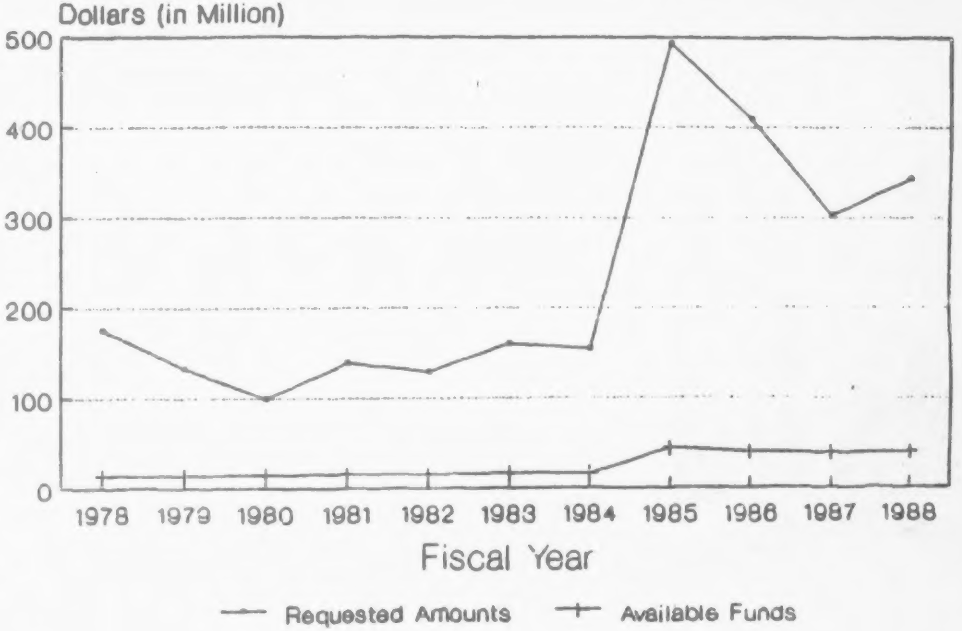
CRGO/USDA
Number of Applications and Grants



Oct/88/MFD-10

Figure 3

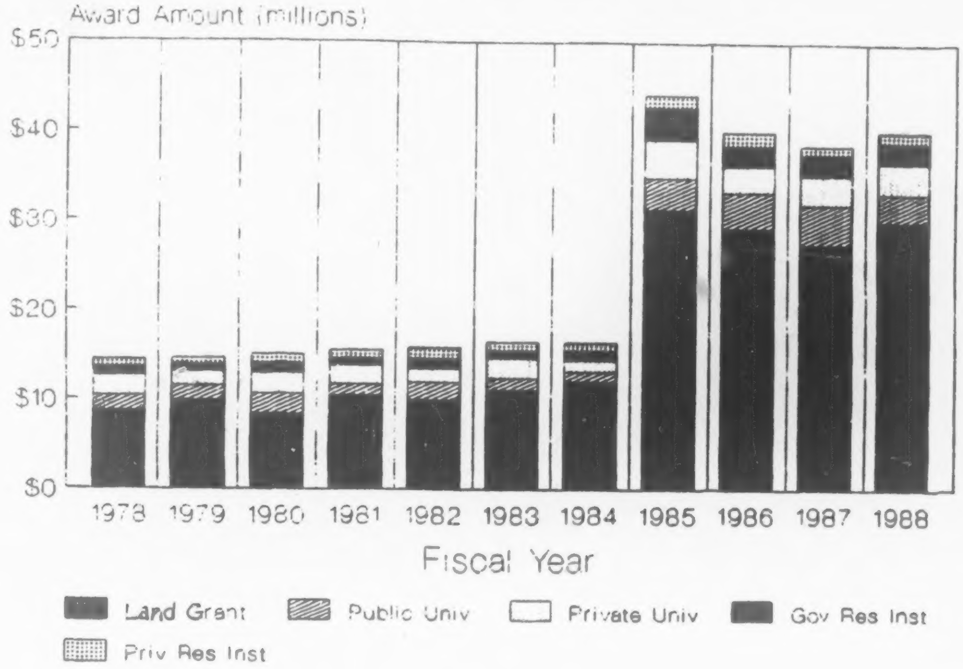
CRGO/USDA
Requested Amounts vs. Available Funds



Oct/88/MFD

Figure 4

CRGO/USDA
Award Amount by Organization



Apr/89/MFD-1

Figure 5

Cooperative State Research Service
Competitive Research Grants Program
Award Statistics

Number of Grants Awarded - 1978-1988

Alabama	16
Alaska	0
Arizona	55
Arkansas	16
California	393
Colorado	42
Connecticut	26
Delaware	2
District of Columbia	7
Florida	94
Georgia	64
Hawaii	6
Idaho	9
Illinois	165
Indiana	100
Iowa	65
Kansas	56
Kentucky	56
Louisiana	28
Maine	10
Maryland	86
Massachusetts	129
Michigan	143
Minnesota	96
Mississippi	14
Missouri	101
Montana	7
Nebraska	50
Nevada	39
New Hampshire	6
New Jersey	32
New Mexico	7
New York	262
North Carolina	89
North Dakota	15
Ohio	101
Oklahoma	38
Oregon	85
Pennsylvania	70
Rhode Island	28
South Carolina	10
South Dakota	5
Tennessee	30
Texas	106
Utah	31
Vermont	12
Virginia	51
Washington	103
West Virginia	2
Wisconsin	159
Wyoming	4

Top Ten Grantee Institutions--1987
(In Millions of Dollars)

	NIH		NSF		CRGO	
1.	Johns Hopkins Univ.	129	UC-San Diego	40.1	Univ. of Wiscon.	2.3
2.	UC San Francisco	117	MIT	35.7	UC Davis	2.2
3.	Yale Univ.	104	U. of Ill.-Urbana	35.2	Cornell U.	2.2
4.	Univ. of Washington	102	Cornell Univ.	34.3	Univ. of Illinois	1.7
5.	Stanford Univ.	96	UC Berkeley	24.3	Michigan State U	1.4
6.	Harvard Univ.	95	Stanford	23.6	North Carolina State	1.2
7.	UC Los Angeles	95	U of Washington	23.1	Univ. of Missouri	1.1
8.	Columbia Univ.	88	Caltech	21.8	Purdue	1.1
9.	U. of Pennsylvania	84	Columbia	21.5	UC Berkeley	1.0
10.	Washington Univ.	81	U. of Michigan	20.6	Ohio State U	0.9

:am 7/24/89

Figure 7

USDA COMPETITIVE GRANTS PROGRAM
AWARDS TO CORNELL UNIVERSITY

PROGRAM		FUNDS
Plant Science (1981-present)		$ 6,813,813
Human Nutrition (82-present)		$ 1,044,610
Animal Science (85-present)		$ 3,062,836
Biotechnology		
Plant (85-present)		$ 5,118,444
Animal (87-present)		$ 292,848
Pest Science (86-present)		$ 3,241,108
Forestry (86-present)		724,622
	Total	$20,298,281
Plant Science Center (88-93)		$ 5,699,700

Fig. 8

BENEFITS OF AG RESEARCH*

INCOME CLASS	AVERAGE FAMILY INCOME	AVERAGE BENEFITS PER FAMILY	TOTAL TAXES FOR AG RESEARCH PER FAMILY	BENEFIT-COST RATIO
< $10K	$5,926	$27.96	$2.41	11.60
$10K - $14.999K	$12,416	$31.99	$6.36	5.03
$15K - $19.999K	$17,444	$35.73	$9.70	3.68
$20K - $24.999K	$22,422	$41.03	$11.98	3.43
$25K - $34.999K	$29,902	$46.21	$16.63	2.78
$35K>	$52,077	$55.88	$41.46	1.35
AVERAGE	$23,338	$39.74	$14.83	2.68

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*Fred C. White. The Benefits and Costs to U.S. Consumers in Various Income Categories of Investment in Ag. Research. IR-6 Report, June 1987

Figure 9

Senator DASCHLE. Thank you, Dr. Scott.

Senator Harkin has a prepared statement—he had to go to another committee—and that statement will be made a part of the record without objection.

[The prepared statement of Senator Harkin can be found on page 237.]

Dr. Scott, let me begin by asking you the obvious question. Why would somebody from South Dakota want to support competitive grants? I look at this chart (figure 6), and that is a pretty compelling argument for me to say let's pour as much as we can into formula funding because I am talking 393 [1] in the last 10 years for California, 262 [1] for New York, and a whopping 5 [1] for South Dakota.

You say that smaller schools ought to become more involved in the competitive grants. The fact is I don't know of a program in agriculture that is more biased toward large schools. But perhaps you can respond to that.

Dr. SCOTT. I do not think it is biased toward the large schools except by the fact that in some of the larger institutions there have been developed the basic scientists to which this program has been addressing its attention. But I think that having—actually, as I might suggest from the personal experience in talking with the people about the Bioenvironmental Stress Laboratory at South Dakota State, I saw faculty there who, by focusing, would be competitive. And in terms of animal studies, the potential exists for those scientists to put a Competitive Grants Program together in terms of the uniqueness of animal reproduction in the cold and very hot environment and so forth.

So I think part of it has been that agriculture has not in some of the institutions been stimulated to think competitively in its whole approach to agriculture research.

Senator DASCHLE. Could it be that they are not stimulated because they have virtually been locked out?

Dr. SCOTT. It is possible, of course, and I suggest myself that some of the curves with the low acceptance rate would tend to provide a negative feedback to continue writing grants and proposals. But——

Senator DASCHLE. One way around this would be to target by geographic area.

Dr. SCOTT. And that is what I suggest.

Senator DASCHLE. And you suggested that. How would one target? Do you have a formula in mind? I used the word "formula."

Dr. SCOTT. There's a process that might not be unlike the EPSCOR from NSF. They would look at proposals, look at the State, the institution, relative to the percentage of funds that come through, let's say, the CRGO grants, and look at total Federal funding in terms of those two criteria, and then on the basis of those numbers, determine the qualification for——

Senator DASCHLE. You were talking about it in your testimony.

Dr. SCOTT. Yes. EPSCOR.

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[1] Number of grants awarded, 1978–1988. See figure 6, p. 267.

Senator DASCHLE. OK. What do you think of that idea, Dr. Huston?

Dr. HUSTON. I must admit I am very fond of formula funds. I think that the advantages are that you can decide at the outset what an appropriate allocation process is because States are not all equal, either in terms of wealth or in terms of agriculture. And it seems to me that once you have that formula approach, you can do as Texas has done or Wisconsin has done, and that is to create a Competitive Grants Program within the State if you are really interested in entrepreneurial training for the scientists. So I would favor the stronger emphasis on formula funds.

Senator DASCHLE. Do I take from that that you are not satisfied with the current balance in the availability of funds between competitive and formula?

Dr. HUSTON. We have struggled—I have been 20 years in this business, and at the outset we struggled to get additional formula funds, over and over again. We failed. One of our leaders proposed a Competitive Grants Program, and we did receive some additional resources. We need the resources, and we are going to work with them either way that we can get them. But if we could get formula funds, I would much prefer them.

Senator DASCHLE. Dr. Scott.

Dr. SCOTT. I would like to just respond. Much more in the written testimony than in the verbal because of Keith's presentation, I did not emphasize my strong belief in the mix of formula and grant funding through the competitive process. I firmly believe in that. I believe, however, that in terms of today's society—and I think it's important. In the science community, so many people have said that agricultural research does not have the credibility, does not have the science reputation. I submit that excellent science is being done in agriculture. And because it is seen as the old system and the old way of doing things, it is not recognized. Because every one of those five examples which I gave, very briefly, have formula funds as a part and as a base of all that effort. So it has to be the two together.

But I think in the climate of science and sort of the joining of the scientific community, the competitive process has to be enhanced, not at the reduction of formula but together.

Senator DASCHLE. The competitive process has to be enhanced. Is that the same as saying that competitive grants have to be better funded?

Dr. SCOTT. I think probably the point that Keith makes on competitive at the local scene would not sell as well as the national competitive process. We do have within most of the experiment stations some sort of a process within the individual station on the allocation of funds, more highly competitive in some than others. But I think the image, the kind of credibility, comes from a nationally equivalent to NSF, NIH approach to this process. And so that is why I feel there needs to be an increase and that that is an important way to join more strongly that science community. And so I think the answer is yes.

Dr. HUSTON. May I comment quickly on it? Let me bring you a perspective from two States: South Dakota, that spends about $4.6 million on research, and New York, that spends $30 million. South

Dakota has something on the order of $500 million more cash receipts in agriculture than New York, and yet it spends not more than a sixth as much. And when you throw in the Federal resources and the grant resources, and you say to yourself, here are two agricultural States that are important to the Nation agriculturally, South Dakota more important than New York, and yet the investments in terms of resources that will develop the local agriculture are drastically different. And yet the South Dakotans are kicking in about $6.50 per person per year for ag research, and the New Yorkers only $1.71.

So you see that there are some sharp differences among States, and I am not at all sure that a competitive national program, a huge one relative to the formula fund, will be as effective as a formula allocation.

Senator DASCHLE. I am not sure I understand Dr. Scott's position with regard to the balance. I understand Dr. Huston's. Is your position that the current balance is about appropriate? Dr. Huston has obviously argued that we ought to see a greater percentage in formula funding. Would your attitude—you said the competitive process ought to be ensured, but by that are you advocating, then, the balance be changed between competitive and formula?

Dr. SCOTT. The balance would change because, in my opinion, the competitive should be increased substantially. And that means, of course, the balance would change.

Senator DASCHLE. OK.

Dr. SCOTT. But I would, again, reiterate the strength of——

Senator DASCHLE. You do not call for the elimination of formula funds?

Dr. SCOTT. No, not at all. In fact, that would be disaster. That would be disaster in terms of——

Senator DASCHLE. We are making progress.

Dr. SCOTT. The problem is allocating limited resources in the most effective way.

Senator DASCHLE. Let me ask you a different question relating to applied and basic research. The criticism I get a lot, regardless of whether it is formula or competitive, is that we are not applying research adequately. Basic research is publishable, the people in the ag research community are very comfortable with it, but farmers and applied researchers are saying: I don't care what it is, we're just not getting our fair share.

Could you respond to that criticism, both of you?

Dr. HUSTON. There is a measure of truth in that in the sense that the growth in basic research, which is essential in the long-term interest of agriculture, has been very marked in recent years. Where in the earlier days most of the agricultural scientists were like me in that they were reared on the farm and trained on the farm and really preferred being out doing things outdoors with farm activities, the number of those has diminished a bit, and the number of lab people has increased steadily. And I think as a consequence the farmers do not see as much out of that as they really would like. And I suppose the hardness of times has had an impact, too, the last 8 or 10 years in terms of the budgets of the farmers.

Senator DASCHLE. Dr. Huston, I am not sure I understand what you are saying. Are you saying, then, that the research is going on but farmers just are not as cognizant of it, and that it is really a matter of ignorance on the part of the farmers?

Dr. HUSTON. No. What I am suggesting is that most of the research is incremental, step by step by step, a little dab, a little dab, a little gain, a little gain. And in that sort of a process, you do not see any amazing ways in which all of a sudden you can change from having a negative cash-flow to a positive cash-flow. You cannot find the technology that will give you 30 more bushels of wheat per acre as compared to a bushel-and-a-half. It is that kind of a slow, steady gain that is frustrating to people who want to move out ahead and cannot move out ahead.

Senator DASCHLE. So your response would be that there is applicability but it is so incremental it cannot be measured, and thereby the criticism is justified to a certain extent because whatever gains are made are intangible?

Dr. HUSTON. They are measurable. At the Texas station, Bobbie Eddleman has just finished measuring what has happened in terms of the change from 1975 to 1986. And they are, indeed, measurable both in terms of farmer gains and in terms of consumer gains. But from the standpoint of the individual farmer, it is terribly difficult for him to sort that out because they are incremental.

Senator DASCHLE. There have been those who have advocated—first of all, Dr. Scott, how would you respond to that?

Dr. SCOTT. Well, I am a bit more optimistic. I see some of the basic research examples moving to the farm. I gave one example, the issue of—and because of the environmental concerns that now exist, the example on the grape berry moth attacking grapes. That is an example of taking a device, a very simple plastic with a wire in it like you wrap on garbage bags and so forth, a twist tie, using that on the grape vines to eliminate the need for pesticides and the costs that are associated with that, because of the basic research that was done relative to the pheromone, which is a basic sex attractant between the male and female insect, for example.

So there are examples of like that. The area of dairy, although controversial. We looked at the nutrient partitioning in animals and said we can produce milk more efficiently. And the number is somewhere between 6 and 11 percent, probably. We have a big issue that is related to the political aspects of too much milk in that particular area and all that comes with that. But from the point of view of efficiency of a small producer, that small producer can produce milk more efficiently, as well as the large producer.

There are other examples from the basic research that are having an effect, and biotechnology—the tomato example. It is not changing the amount of tomatoes produced per plant but a storage life increase of a doubling effect and tomatoes that taste good, that are vine-ripened rather than typically unripened and put into storage and ripened there, will change the quality of that product and ultimately have an effect back on both the farmer and the consumer.

So I see these kinds of basic things, also with the applied, moving forward.

Senator DASCHLE. Some have advocated to us that interdisciplinary task forces—farmers, industry groups, applied researchers, the whole group of people affected—ought to have a greater role in determining the competitive grants. What would be your attitude toward that kind of a role?

Dr. SCOTT. I think that that is certainly a possibility, and one of the things, as I suggested, was that the number of areas for competitive grant opportunities are too small. They have been limited to the plant scientists, and God knows that is necessary, but the alternatives area, for example, that I mentioned and other areas need to have a competitive component as well. And so the involvement of producers and farmers, consumers into this process, I think it is important and would be very valuable—in conjunction with peer scientific panels.

Senator DASCHLE. I would imagine if you asked somebody in South Dakota today to what degree are we participating in applied research, I think that the answer would be overwhelmingly to a very minimal degree. Dr. Huston, would you differ with that point of view?

Dr. HUSTON. Yes. I think if you look at your branch stations—and I cannot quite bring back the list of them, but there are about eight or nine locations throughout the State that essentially do farming types of research, and you go to the central station at Brookings, you will find there, as I have done, most of it is, in fact, the sort of stuff that leads to improvements in efficiency in farming practices.

Senator DASCHLE. How can we sell that better? If you are convinced, and you obviously both feel that we are doing a better job at applicability than what may be the conventional wisdom, part of it, then, must be the way it is being presented. Somehow that message has to get out better. I have to tell you, I think there is going to be increased pressure for Congress to show how applied research is being funded and is being given its due in the years ahead, and maybe as early as we consider the new farm bill. And I am going to be looking for ways to demonstrate that, but I would hope that somehow those who are so directly involved in it can give us some leadership with regard to how that might be done.

Dr. HUSTON. During the years that I was in station administration in Kansas and Minnesota, one of the easiest devices was simply to point out the new wheat varieties that we developed in the station; the reduction in use of fertilizers that we were able to demonstrate as significant practices; in northern Minnesota, the grass seed industry that we developed through the research; the change in sunflowers, and the movement of corn plants from southern Minnesota farther north. A whole array of these, one can put a dollar and cents value on, but oftentimes the individual forgets in terms of his perspective about the world.

Dr. SCOTT. The same kind of thing exists. For example, apple varieties in New York that are resistant to some of the pests, and alfalfa, barley and oats, and that sort of thing.

So there has been a tremendous amount of applied research that has made it, so to speak, on to the farm and with the plow. But, undoubtedly, the whole process of a society that is so oriented away from the farm and only through ag in the classroom, which is attempting to get into the school system a knowledge of how food is produced, are we able to start making some, I think, inroads back into a knowledge there.

Senator DASCHLE. What would be wrong with targeting either competitive or formula funds to specific needs?

Dr. HUSTON. It has been done before on the formula side. There were earmarks in the early seventies and before that. And this has been taken up by the stations as appropriate; the difficulty——

Senator DASCHLE. Do you think there is something to be said for doing that?

Dr. HUSTON. It can be done if you think it is appropriate.

The basic problem is——

Senator DASCHLE. But I am asking you if it is appropriate. Is it appropriate?

Dr. HUSTON. Yes, it is appropriate. But the problem with it is agriculture is not homogeneous. And so if you talk about a specific commodity or a specific, like range, for example, you are talking to the West, or you are talking about irrigated agriculture, you are talking to the West.

And so there are certain topics. The last one that I remember was forage and range in the seventies. And we moved the resources in there. In fact, we moved the resources in there in much greater quantities than were recommended by the Congress. So the system has responded and is capable of responding to that.

Dr. SCOTT. Actually, the competitive grants is in fact very special because that is, in a way, why some institutions have not had much input in terms of grant receipts from the competitive process.

Senator DASCHLE. But it is special almost in a reverse way. I mean it is special in that I do not think there is any master plan as to how these grants are awarded or the priorities with which they are provided.

You know, I think California comes up with an excellent idea. And they sell it in the system, and they have the ability to sell it all the most importantly. They have the ability to make the grant application.

South Dakota may have an even better idea. And as a result of their inability to do it, probably are not as, you know, are certainly not in a stronger position to make their case. And thereby, even though their idea may be better, their need may be greater, the fact is that because the proposal is so much more effectively provided through California, it is going to happen that way. Somehow that problem has to be addressed more effectively.

Dr. SCOTT. I do not think it is a matter of California presenting it more effectively. It is a matter of does the program area exist. And there are the 12-areas that are documented on page 4 of my prepared material, 12 specific areas.[2]

So the idea has to fall within——

Senator DASCHLE. Fifty.

Dr. SCOTT [continuing]. Within the 12.

Senator DASCHLE. You call those specific?

Dr. SCOTT. Yes. They are specific in a sense, for example, you cannot put in proposals that deal with certain areas because they do not fit the kind of focus that exist within those 12.

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[2] See page 255 for the 12 areas of research.

Senator DASCHLE. Oh, that is true. But I guess—there are 12 categories clearly——

Dr. SCOTT. Yes.

Senator DASCHLE. But I guess your definition is specific and mine may be a little different.

But I think the point is that we could, from a policy point of view, direct those funds a lot more effectively than we do——

Dr. SCOTT. In different ways, that is right.

Senator DASCHLE. In different ways. And even perhaps more in an applied way if we saw the need.

Both of you were arguing that, regardless whether it is formula or competitive grants, that the applied functions are there, they are just not as well understood as they might be.

Let me ask you one last question and then we will go to the second panel.

Many of the witnesses in our previous hearings have argued that Federal funds comprise the majority of the funding for agricultural research in many schools but, in spite of that fact, you have what might be a given project whereby that project is 20 percent funded by private sources and 80 percent funded by government sources. And it is the 20 percent that really dictates the direction of the 80 percent, thereby, as it was put on a couple of occasions, the tail is actually wagging the research dog with regard to the direction research goes in agriculture to a certain extent.

I am not making their case very persuasively, but the case is one I am sure both of you have heard in the past.

Could you respond to that?

Dr. HUSTON. The most common location of that is in our pest control people who, in order to test the effectiveness of wheat control or insect control or disease control in the case of fungicides, must have the chemicals that are there.

The chemical companies provide the chemicals free in most cases. And each of the companies provides their competitive products. The issue is not so much whether the chemical will do what the company says it will do but how well it will do it under the specific set of conditions that exist in that State.

They usually provide the chemicals and provide a small amount of money. So weed scientists or the entomologists who are hired to examine methods of weed control and insecticide use use those. And the impression is that because this guy is getting the chemicals and a small chunk of money—usually $4,000 or $5,000 from the chemical company, that he in fact is essentially working for the chemical company when most of the rest of his resources come from the State.

So I think there is an element of overemphasis on it. There is always a danger assuredly. But my sense of it is that even though in those cases where it is most obvious, there is less of that. And I guess my concern is more in terms of the granting programs leeching off some of those resources that may not be as close to the needs of the State as the needs that might be addressed had the person had enough State resources from the Director's office to do what seems appropriate. And I think that is the bigger concern in my mind.

Senator DASCHLE. Dr. Scott.

Dr. **Scott**. Yes. I agree with Keith on the aspect of the misconception here. I do not agree that, in my experience, that either industry or the Competitive Grants Program, or grants from different groups, have had that kind of overriding influence on what has been happening.

Generally speaking, what happens is, scientists and a group of scientists develop a particular approach, and they seek a multitudinous source of funds. And everybody is leveraging everybody else today in this whole process.

And so they are putting these funds together and being responsive, yes, to the various groups. But I don't see industry, at least in our research program, wagging the dog. And I do not believe that the Competitive Grants Program has either in the kind of work that we wanted to do.

Senator **Daschle**. Very well. We could go on. This has been a very helpful discussion for me. I appreciate both of your statements and the excellent answers you provided to many of my questions.

I may have the need to contact you, at some point in the future, to pursue many of these issues some more, prior to the time we take the issue up in the farm bill.

And again let me express my gratitude to both of you. Thank you.

Our second panel is comprised of Dr. Patrick Jordan, the Administrator of the Cooperative State Research Service, USDA. And he is accompanied by Dr. Paul O'Connell, the Deputy Administrator of Special Programs for USDA and Dr. William Tallent, the Assistant Administrator for Cooperative Interactions.

And Dr. Gary Jolliff is our second witness on the panel. He is the professor of crop science, Oregon State University. And finally Mr. Todd Sneller, the Administrator of the Nebraska Gasohol Committee in Lincoln. I wanted to be sure, since Todd is on the second page, whether he is part of that panel or not, but he is.

Dr. Jordan, we are delighted you could be with us this morning. We appreciate your cooperation, the help you have given the staff in preparing for the hearing. We would invite you to present your testimony at this time.

Let me emphasize again that we will try to keep our initial remarks brief so we can replicate the discussion we had with the first panel.

Dr. Jordan.

STATEMENT OF JOHN PATRICK JORDAN, ADMINISTRATOR, COOPERATIVE STATE RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC; ACCOMPANIED BY PAUL F. O'CONNELL, DEPUTY ADMINISTRATOR, COOPERATIVE STATE RESEARCH SERVICE (CSRS); AND WILLIAM H. TALLENT, ASSISTANT ADMINISTRATOR, COOPERATIVE INTERACTIONS, AGRICULTURAL RESEARCH SERVICE (ARS)

Dr. **Jordan**. Thank you, Senator.

Mr. Chairman, I welcome the opportunity to appear before this subcommittee to testify on the general subject of alternative crops and products. This is a subject of continuing interest in the U.S. Department of Agriculture.

I have with me today, as you have indicated, two individuals who should help markedly in answering specific questions that you might have.

USDA HAS A LONG HISTORY OF INVOLVEMENT IN UTILIZATION RESEARCH

The Department of Agriculture has a long history of involvement in utilization research—including both food and nonfood products. In 1938, Congress authorized the creation of four regional agricultural laboratories which would be devoted to product research and development. These Centers, operated by the Agricultural Research Service, and located at Peoria, Illinois; Wyndmoor in Pennsylvania, that is a suburb of Philadelphia; Albany, California, near Berkeley; and New Orleans, Louisiana, have been involved in the research and development which led to many of the promising industrial products derived from agriculture, as well as for products used in the production of our food and fiber.

SUPER SLURPER AN EXAMPLE OF RESEARCH EFFORTS

An example of a product coming out of these research efforts is super slurper, which is made from cornstarch. It is a moisture absorbing material what is used in gas pumps, diapers, batteries, seed coatings, and other diverse applications. Another promising market for surplus corn is in biodegradable plastics. In this bag is an example of such. Use of this product in the form of garbage and shopping bags, food containers and utensils, and agricultural mulching film would reduce our dependence on petroleum for plastics manufacturing, develop a new product market for corn, and to help clean up the environment. Extensive developmental research is continuing to achieve these objectives.

SEVERAL EXAMPLES OF NEW CROPS

There are several examples of new crops where the Department of Agriculture, and particularly the Agriculture Research Service is looking for practical commercial uses. These are in various stages of development and include: crambe and meadowfoam to replace imported long-chain fatty acids that are used in lubricants and plastics; lesqueralla can replace imported caster oil for lubricants, coatings, and plastics; cuphea oil can be used for fine soaps and shampoos in lieu of imported coconut oil; kenaf is being developed as a source of pulp for papermaking; guayule is being developed as a domestic crop source of natural rubber, in cooperation with the Department of Defense and, of course, the university system as well.

Commercialization of nonfood agricultural technologies is a natural extension of decades of basic and applied research by Federal laboratories, university laboratories and, indeed, industrial laboratories too. This activity is occurring in the Special Programs Unit of the Cooperative State Research Service. Demonstration projects are organized to use Federal and university laboratory results and to prepare farmers for commercial scale production and industry for commercial scale use of agricultural raw materials. This takes, Mr. Chairman, 3 to 5 years of intense cooperative development efforts in the public-private partnerships under good economic and business conditions before all parts of a vertical agroindustrial system are proven and in place. Three demonstration projects are underway: kenaf for *newsprint*, guayule for natural *rubber*, and crambe/rapeseed for industrial *oils*.

KENAF

Kenaf is an annual nonwood fiber plant that yields 7 to 10 tons of dry matter per acre, and is particularly desirable in the Cotton Belt. Kenaf can be used for pulp, paper and fiber product manufacturing. *Newsprint* made from the wholestalk kenaf is high quality, requires less processing energy and chemicals, and has been the focus of development and commercialization efforts. And this is an example of a newspaper that has been printed solely on kenaf paper. Businesses for newsprints and nonwoven products, including carpet pads and fruit boxes, are expected this year.

GUAYULE

Guayule, a perennial shrub native to the Southwestern United States, guayule is the basis for developing a domestic natural *rubber* industry. You can actually make tires from it, and there is a prototype plant being developed and which will facilitate the production of high molecular weight rubber for aircraft tire specification testing and low molecular weight rubber, resins, and bagasse for value-added coproduct development. In fact, we found that, in these demonstration projects, sometimes the coproducts are equal in value, perhaps even in the few cases exceeding the value of the main product that we were heading for.

CRAMBE/RAPESEED

Crambe and rapeseed are annual seed crops similar to oats and wheat, in terms of growing periods, equipment used to develop and plant them and harvest them and management practices. And they yield 1,500 to 2,000 pounds of seed per acre. Raw *oils* from the seeds contain high percentages of high erucic acid, a high erucic acid activity. And the raw oils from the seeds contain not only that high percentage of erucic acid, but that can be used to manufacture nylon, plastics, lubricants, and (bake-on) paints and coatings.

IN FISCAL YEAR 1989 CONGRESS FUNDED THREE CONSORTIUMS IN MIDWESTERN STATES

There were three consortia in the last fiscal year that the Congress developed and funded for alternative crops in product issues. At least they addressed them to a limited extent. These are the Iowa Biotechnology Consortium, the Michigan Biotechnology Institute, and the Midwest Biotechnology Consortium. And these are particularly well-developed, and I will take one of them as an example, the MBI, the Michigan Biotechnology Institute, which is developing products which can be used in the plastics building and do it at a cheaper rate than anything we have ever before.

FUNDING DECISIONS

Funding decisions in these areas are made as a part of the overall funding decisions in ARS and CSRS. Both agencies have comprehensive priority setting and planning procedures for research. Priorities of the administration, the Congress, and developed through the constituent groups are primary inputs to this process. Recognizing that the priority of new products from agriculture, including new crops, is increasing, the Department agrees that research resulting from such products should receive increasing emphasis.

Mr. Chairman, that completes my prepared statement. I and my associates welcome the opportunity to respond to any questions.

[The prepared statement of Dr. Jordan follows:]

PREPARED STATEMENT OF JOHN PATRICK JORDAN, ADMINISTRATOR, COOPERATIVE STATE RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC

Mr. Chairman, I welcome the opportunity to appear before this subcommittee to testify on the general subject of Alternative Crops and Products. This is a subject of continuing interest to the U.S. Department of Agriculture.

I have with me today two individuals who can assist me with providing the subcommittee pertinent information on this subject. Dr. Paul F. O'Connell, Deputy Administrator, Cooperative State Research Service (CSRS), who is responsible for finding alternative opportunities for U.S. farmers—ranging from industrial crops and uses to sustainable agriculture and aquaculture; and Dr. William H. Tallent, Assistant Administrator for Cooperative Interactions, Agricultural Research Service (ARS), who has had extensive experience in postharvest utilization research and administration.

The Department of Agriculture has a long history of involvement in utilization research—including both food and nonfood products. In 1938, Congress authorized the creation of four regional agricultural laboratories which would be devoted to product research and development. These centers, operated by the Agricultural Research Service, and located at Peoria, Illinois; Wyndmoor, Pennsylvania; Albany, California; and New Orleans, Louisiana, have been involved in the research and development which led to many of the promising industrial products derived from agriculture, as well as for products used in the production of our food and fiber.

An example of a product coming out of these research efforts is super slurper which is made from cornstarch. It is a moisture absorbing material that is used in gas pumps, diapers, batteries, seed coatings and other diverse applications. Another promising market for surplus corn is in biodegradable plastics. Use of this product in the form of garbage and shopping bags, food containers and utensils, and agricultural mulching film would reduce our dependence on petroleum for plastics manufacturing, develop a new market for corn, and help to clean up the environment. Extensive developmental research is continuing to achieve these objectives.

There are several examples of new crops where ARS is looking for practical commercial uses. These are in various stages of development and include:

—Crambe and meadowfoam to replace imported long-chain fatty acids that are used in lubricants and plastics;
—Lesqueralla can replace imported castor oil for lubricants, coatings, and plastics;
—Cuphea oil can be used for fine soaps and shampoos in lieu of imported coconut oil;
—Kenaf is being developed as a source of pulp for papermaking;
—Guayule is being developed as a domestic crop source of natural rubber, in cooperation with the Department of Defense.

Commercialization of nonfood agricultural technologies is a natural extension of decades of basic and applied research. This activity is occurring in the Special Programs Unit of CSRS. Demonstration projects are organized to use Federal and university laboratory results and to prepare farmers for commercial scale production and industry for commercial scale use of agricultural raw materials. It takes 3-5 years of intense cooperative development efforts in public-private partnerships under good economic and business conditions before all parts of a vertical agroindustrial system are proven and in place. Three demonstration projects are underway: kenaf for *newsprint*, guayule for natural *rubber*, and crambe/rapeseed for industrial *oils*.

KENAF

An annual nonwood fiber plant, yielding 7–10 tons of dry matter per acre in the Cotton Belt. Kenaf can be used for pulp, paper and fiber product manufacturing. *Newsprint* made from wholestalk kenaf is high quality, requires less processing energy and chemicals, and has been the focus of development and commercialization efforts. Businesses for newsprint and nonwoven products (carpet pads, fruit boxes) are expected this year.

GUAYULE

A perennial shrub native to the Southwestern United States, guayule is the basis for developing a domestic natural *rubber* industry. This year, a prototype processing facility will produce high molecular weight rubber for aircraft tire specification testing and low molecular weight rubber, resins, and bagasse for value-added coproduct development.

CRAMBE/RAPESEED

Annual seed crops similar to oats/wheat for growing period, equipment, and management practices, yield 1,500–2,000 pounds of seed per acre. Raw *oils* from the seeds contain high percentages of high erucic acid which can be used to manufacture nylon, plastics, lubricants, and (bake-on) paints and coatings.

In FY 1989, Congress funded three consortiums in Midwestern States that will be addressing the alternative crops and products issue, at least to a limited extent. These are the Iowa Biotechnology Consortium, Michigan Biotechnology Institute, and Midwest Biotechnology Consortium. For example, at the Michigan Institute one of their key goals is for faster development of economically validated, industrially useful products and processes.

Funding decisions in these areas are made as a part of the overall funding decisions in ARS and CSRS. Both agencies have comprehensive priority setting and planning procedures for research. Priorities of the administration, the Congress, and constituent groups are primary inputs to this process. Recognizing that the priority of new products from agriculture, including new crops, is increasing, the Department agrees that research resulting in such products should receive increasing emphasis.

Mr. Chairman, that completes my prepared statement. I and my associates welcome the opportunity to respond to any questions.

Senator DASCHLE. Dr. Jordan, let me just ask you one question before I move on to Mr. Sneller and Dr. Jolliff.

I am a little confused with regard to how much of the research budget, in dollar amounts, is allocated to alternative crops at this point. My staff has given me the figure of about $1 million in specific funding availability designated for alternative crops. But there is obviously money through competitive grants and formula funding as well.

We have not been able to ascertain what that figure is. Could you give me, first of all, if you could, the total research budget and then, secondly, the allocation as best as you can provide it to alternative research funding from that budget?

Dr. JORDAN. We will be glad to provide specifics, Mr. Chairman. There are, in that specifically identified area, $3.6 million, almost $3.7 million in the Agricultural Research Service budget. But if you take the entire area of developing new and improved products and processes, both including food and nonfood products, then it would include forestry and so on.

All the agencies of the USDA come up to about a total of $74 million. The university component of that is about $52 million, just about an even half of it. So it is a larger figure. And it is, as you say, Mr. Chairman, it is spread in the basic program of the Agricultural Research Service, these four regional laboratories are a big and important part of that. And they are also in the basic—we prefer to call the formula funds base funding because that is exactly what it is that comes out of the Cooperative State Research Service to the universities and some of it comes out of the competitive grants, as you have indicated, plus special grants which is very well directed in this area.

Senator **Daschle**. So you are talking about $110 million out of the universe of about $250 million?

Dr. **Jordan**. No. $125 million out of all the USDA and colleges and universities for research and development, which is about $1.1 billion from USDA and another $1.2 billion from non-Federal sources at universities. So that is about the percentage.

So I am talking about the entire USDA's and colleges and universities research and development budgets for the alternative crops and products.

Senator **Daschle**. Not that you would have to provide it for me now, but could you give me a breakdown of where that $110 million is spent?

Dr. **Jordan**. Yes, and I can talk about the specific subunits, for example, how much of it is in a new and improved forest products and that kind of breakout if that would be helpful.

[The material was subsequently submitted for the record and follows:]

U.S. DEPARTMENT OF AGRICULTURE—UTILIZATION AND NEW CROPS

[Dollars in thousands]

	Fiscal year		
	1989 actual	1990 estimate	1991 budget
New products/processes—nonfood:			
Agricultural Research Service	$24,254	$23,493	$23,493
Cooperative State Research Service	5,079	5,142	2,811
Economic Research Service	7	11	14
Forest Service	10,263	10,330	10,366
Total	39,603	38,976	36,684
New products/processes—food:			
Agricultural Research Service	28,851	29,478	29,478
Cooperative State Research Service	5,692	5,687	5,382
Economic Research Service	7	11	14
Total	34,550	35,176	34,874
Total, new uses:			
Agricultural Research Service	53,105	52,971	52,971
Cooperative State Research Service	10,771	10,829	8,193
Economic Research Service	14	22	28
Forest Service	10,263	10,330	10,366
New crops:			
Crambe/rapeseed:			
Agricultural Research Service	215	210	210
Cooperative State Research Service	609	605	390
Economic Research Service	5	8	11
Total	829	823	611

U.S. DEPARTMENT OF AGRICULTURE—UTILIZATION AND NEW CROPS—Continued

[Dollars in thousands]

	Fiscal year		
	1989 actual	1990 estimate	1991 budget
Guayule:			
Agricultural Research Service	916	902	902
Cooperative State Research Service	702	693	702
Economic Research Service	5	8	11
Total	1,623	1,603	1,615
Jojoba:			
Agricultural Research Service	114	112	112
Cooperative State Research Service	106	154	6
Economic Research Service	5	8	11
Total	225	274	129
Kenaf:			
Agricultural Research Service	672	1,106	1,106
Cooperative State Research Service	35	35	35
Economic Research Service	5	8	11
Total	712	1,149	1,152
All other:			
Agricultural Research Service	1,744	1,776	1,776
Cooperative State Research Service	596	501	72
Economic Research Service	20	33	43
Total	2,360	2,310	1,891
Total, new crops:			
Agricultural Research Service	3,661	4,106	4,106
Cooperative State Research Service	2,048	1,988	1,205
Economic Research Service	40	65	87

Senator **Daschle**. That would be helpful. Very good.

Dr. Jolliff.

STATEMENT OF GARY D. JOLLIFF, PROFESSOR OF CROP SCIENCE, LEADER, NEW-CROPS RESEARCH PROJECT, OREGON STATE UNIVERSITY, CORVALLIS, OR

Dr. **Jolliff**. Thank you, Mr. Chairman.

I appreciate the opportunity to be here, and I think, after the previous discussions, I will be quite brief in some of the points I make.

THE NEED TO DIRECT FUNDS TO NEW CROP DEVELOPMENT MAY BE THE KEY THING WE ARE LOOKING FOR

I think that the need to direct funds to new crop development may be the key thing we are looking for.

REMARKS CONCERNING TESTIMONY

I would preface my remarks with the greatest of regard and respect for these friends in USDA. What I have to say about some of the history of new crop development in USDA is no reflection whatsoever on individuals, but purely on the system. And I think we can say that, without a doubt, there is not an adequate voice for new crop development in this Nation. There has not been a voice at the appropriate level, perhaps in the history of the Nation. Therefore, since USDA is not allowed to ask for funds, and in most cases they are facing constant and very, very severe pressure to allocate these very scarce resources in agricultural research, new crops do not get funded, and thus do not get developed.

I have concluded that it is politically unlikely, if not impossible, that under the current funding or organizational structure—and after hearing some of the comments today, it may be simply a funding structure—that we cannot provide the kind of development of new crops that are needed by these farmers that you are talking about.

I just spent some time with three family members who are pouring over the conservation reserve decisions that they have to make. They have heard rumors about a new crop, canola, and they are out there asking the same kinds of questions of me just like you say that your constituents ask of you.

So I will be brief, as I said, and then maybe if there are things you want to pursue further, you can at a later time.

I come to you as a crop scientist currently engaged in new-crops research, and some of my background has been given in earlier testimonies here a year ago and 2 years ago on related topics. And as you well know, hundreds of billions of taxpayer dollars have been spent on programs related to surplus ag commodities. This chronic problem is likely to continue getting worse unless farmers are given more options of profitable new crops to grow.

LEARN TO USE NEW CROPS TO PROFITABLY PRODUCE MARKETABLE PRODUCTS FROM THE ESTIMATED 40 TO 100 MILLION ACRES OF EXCESS CROPLAND

A practical answer to part of this national problem is to learn to use new crops to profitably produce marketable products from the estimated 40 to 100 million acres of excess cropland. In printed materials I provided written evidence that this approach is technically feasible and economically reasonable. For whatever reason—I think it is perhaps the institutional structure we are talking about—this need for new crops has not been met. There is a lot of history that we can bring to bear on this from the agricultural research background point of view.

The answer seems to be that Congress can be the source of innovation to change the system. And, of course, that is what we are here today to talk about.

New crop development emphasis has been recommended to Congress by special task forces and study groups repeatedly since at least the 1930's, and we have documented that.

I think it is important to note that USDA has opposed efforts by Congress to create organizational structure to develop these new crops. I am not sure just why USDA has done that. That may be just part of the nature of the system. It is certainly not necessarily a reflection on individuals.

LACK OF CROP DIVERSITY

Thus, our Nation is suffering economically, environmentally, strategically and, I think, socially in our rural areas from the lack of crop diversity. History shows that within the current organizational structure of USDA, political forces would threaten the survival of funding systems devised to appropriately develop new crops. I could comment on the history in the USDA Peoria Lab that Dr. Jordan mentioned earlier, and new crops like meadowfoam, which I work on, would make a nice example if you want to pursue that one.

BUDGET ALLOCATIONS REVEAL THE DEEPEST COMMITMENTS OF ANY INDIVIDUAL OR ORGANIZATION

Budget allocations reveal the deepest commitments of any individual or organization. The record shows that the USDA has not adequately invested in new crops research and development.

In June of 1987, in his testimony at this subcommittee, the Assistant Secretary for Science and Education responded to a similar question about how many dollars are going into new and alternate products. It was somewhere in the neighborhood of $25 million in USDA.

But the important point was he said that there was $2.7 million going into new crops. I have given other written materials to show that we should be willing to spend at least that much on each new crop if we really want to get them developed. I think Congress has to decide how many crops we want to work on.

So I think the issue is just simply trying to figure out how to come up with an institutional innovation to provide the environment to direct the resources where Congress thinks we need to go.

I will stop now and try to respond to particular questions.

[The prepared statement and attachments of Dr. Jolliff follow:]

Written Statement of Gary D. Jolliff, Professor of Crop Science, Leader, New-Crops Research Project, Oregon State University

Before the

U. S. Senate Committee on Agriculture, Nutrition, & Forestry
Subcommittee on Agricultural Research and General Legislation

Hearing on Funding Mechanisms for Agricultural Research

Washington, D.C.
July 27, 1989

Mr. Chairman, and members of the Subcommittee, my name is Gary Jolliff[1]. I am both honored and pleased to be invited to come before you as a crop scientist, currently engaged in research on new-crops, to comment on funding mechanisms for new-crops research and development.

I will focus my remarks on the issues related to funding mechanisms for the research and development of new crops. In particular, I will explain why new-crop funding requires a new organizational entity.

First however, I draw your attention to the footnotes which cite testimony and printed reference materials that I presented to this Subcommittee on related topics in 1987[2] and 1988[3]. These materials include information on my professional background and also deal with the complex issues of crop development, risk, profit, and politics. Also, I have submitted for the Subcommittee files, several exhibits with a written 'Explanation of Exhibits' statement. The justification and documentation of much of what I present today is contained in these three sets of reference materials.

Mr. Chairman, my opinions are based heavily on: 1) my experiences of the past six years during which I served on two national task forces, each of which evaluated new-crop development issues, and 2) my experiences of approximately the past ten years as leader of the New-Crops Research Project at Oregon State University.

NEW ENTITY WITH CLEAR MANDATE

I have concluded, as did both of the task forces, that the single most important need for developing new crops for American agriculture is an institutional innovation at the national level. That entity, created by Congress, would execute the details needed to meet the national commitment, again made by Congress, to new-crop development. That innovation needs to take the form of a Congressionally authorized management entity which has responsible organizational structure, resources, accountability, and continuity to foster new-crops development over the next several decades.

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[1] Dep. of Crop Sci., OR State Univ. (OSU) and OR Agric. Exp. Sta. (OAES), Corvallis, OR 97331. The views expressed are those of the author and do not represent an official position of either OSU or the OAES.

[2] New Uses for Farm Products, S. Hrg. 100-471, June 26,1987 (pages 221-329).

[3] The Agricultural Research Commercialization Act of 1988, S. Hrg. 100-832, June 6, 1988 (pages 58-131).

The USDA has had a hundred years to develop new crops, but has not produced what the nation needs. There is much evidence that substantial progress could be made reasonably economically through the appropriate organizational structure. This subcommittee is probably the most logical forum for launching the needed initiative.

According to Ruttan and Hayami[4], 'Institutions are the rules of society or of organizations that facilitate coordination among people by helping them form expectations which each person can reasonably hold in dealing with others. They reflect the conventions that have evolved in different societies regarding the behavior of individuals and groups relative to their own behavior and the behavior of others. In order to perform the essential role of forming reasonable expectations in dealing among people, institutions must be stable for an extended time period. But institutions, like technology, must also change if development is to occur.'

Based on this perspective, skillfully articulated by Ruttan and Hayami, I would judge the historical USDA involvement in new-crop development to be inadequate. In my judgement, the U.S. does not have an institutional structure for the development of new crops. Thus, as Ruttan and Hayami suggest, development is slowed. The lack of a set of rules to form reasonable expectations related to new-crop development, has severely limited progress during the past century. I have experienced this frustration personally, have read of it in the literature, have personally heard of it from fellow scientists, and have discussed some aspects of it in the references cited above.

USDA bureaucratic hurdles encountered by Frank N. Meyer while collecting soybean germplasm around the turn of the century are revealing. Also, because of lack of focus and commitment, thousands of soybean germplasm entries were lost through neglect.

These kinds of germplasm losses have occurred with meadowfoam. No mechanism exists for focusing needed attention to meadowfoam germplasm, or on most of the other areas of need for development. The December 1988 issue of National Geographic listed a species of meadowfoam as endangered. Also, the world germplasm center is the U.S. Pacific coast states. Yet virtually nothing, if anything, is being done on an ongoing basis by USDA to develop, organize, and characterize this germplasm. I have used one of these wild species, found only in southern Oregon, in my current meadowfoam breeding and variety improvement program.

Please keep in mind that I am not blaming individuals within USDA, but rather the system. I am confident that, if placed within the current organizational structure of the USDA, I would operate very much like other scientists and administrators.

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[4] Ruttan, V. W., and Y. Hayami. 1984. Toward a theory of induced institutional innovation. J. Dev. Studies 20:203-223.

The institutional structure which governs conventional agricultural research, production, marketing, and related policy is long-standing, highly specific relative to existing commodities and organizations, and very well established. Again, Ruttan and Hayami point out that 'Institutions that have been efficient in generating growth in the past may, over time, come to direct their efforts primarily to protecting the vested interests of some of their members by maintaining the status quo and thus become obstacles to further economic development.' A recent discussion of agricultural research issues by California Congressman George Brown Jr.[5] could lead one to believe that many in Congress think U.S. agriculture could use some institutional innovation. He particularly refers to the suggestion of some recent writers that the agricultural suppliers and processors are the primary beneficiaries of publicly funded agricultural research.

If institutional innovation is needed in agriculture, who should do the innovating? Does one allow the 'fox to guard the chicken coop'? Is it possible to identify the 'fox'? Does a 'fox' really exist?

Congressman Brown also pointed out that public interest groups have been calling for research in the areas of food, worker, and environmental safety, while having no interest in hearing about higher yields or new pesticides.

My observation that institutional innovation is needed to develop new crops in the U.S. is not new thinking. Wheeler McMillen[6], with the assistance of industrialist Henry Ford, and the support of Herbert Hoover and Thomas A. Edison organized the Farm Chemurgic Council to stimulate new thinking in the 1930's. Food surpluses were a problem. The inelasticities of food demand were recognized. The goal was to expand industrial use of U.S. farm products.

As president or chairman of the Farm Chemurgic Council for a quarter century (1937-1962), Wheeler McMillen stimulated the development of new industrial uses for farm products and new markets for farmers. Because of interest created by national and regional Farm Chemurgic Council meetings and McMillen's writings and speeches, an amendment to the 1938 Agricultural Adjustment Act included $4 million for construction of four regional U.S. Department of Agriculture research laboratories to develop new uses for farm products.

Those laboratories--which were constructed in Wyndmoor, PA, Peoria, IL, New Orleans, LA, and Albany, CA--have since spawned numerous developments, such as dehydrated foods, a fast-form method of producing penicillin that was of great value in World War II and since, synthetic cork, rubber from guayule, industrial oil from crambe, wash and wear cotton, frozen juice concentrate, and super absorbent materials from corn starch now widely used in disposable diapers, to name a few.

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[5] Brown, George E., Jr. 1989. The critical challenges facing the structure and function of agricultural research. J. Prod. Agric. 2:98-102.

[6] Much of the information about Wheeler McMillen is taken directly from a summary (author unknown) provided to participants at the Secretary's Challenge Forum (on New Crops and New Farm Products), U.S. Department of Agriculture, Washington, D.C., October 11-12, 1984.

In spite of these successes, the U.S. did not institutionalize the vision, initiative, leadership, and enthusiasm of Wheeler McMillen and the Farm Chemurgic Council. The Chemurgic Council and their communication medium, the Chemurgic Digest[7], ceased to exist within a few years after the retirement of Wheeler McMillen. No 'rules of society or organization' were put into place to facilitate the formation and perpetuation of expectations which can be reasonably held as our nation deals with new-crop development.

Interestingly, Wheeler McMillen was still active during the 1950's when the U.S. was again plagued with agricultural surpluses. He saw Congress fund the USDA to explore the plant kingdom for sources of useful, non-surplus, substances which might be profitably produced on U.S. farms and not compete with existing commodities.

The USDA Northern Regional Research Laboratory in Peoria, IL, which he helped establish, was the focal point of that effort. In the late 1950's the wild flower meadowfoam (Limnanthes), which I have personally studied for more than ten years, was one of these wild plants whose seeds contain potentially useful oil. For that brief period, the USDA focused on the discovery of potential new crops. But never has there been an adequate focus on the subsequent development of new crops to make them profitable.

No national provision existed for investing in the improvement and development of plants such as meadowfoam for production purposes. The agronomic development of meadowfoam has occurred almost entirely in the state of Oregon because of a local need. Approximately 30 years lapsed before the USDA initiated (at the Peoria lab) meadowfoam oil utilization research to support the crop development effort in Oregon. That USDA effort resulted from cooperation between the Oregon Meadowfoam Growers Association and the Oregon Congressional delegation to secure earmarked USDA funding. History indicates that vigilance is needed to assure that the funds appropriated for meadowfoam research continue to be used for meadowfoam and not diverted to commodities having more powerful political support (even if those commodities have justifiable research needs).

Under current institutional arrangement in the U.S., there are numerous political, organizational, and economic barriers which virtually preclude timely new-crop development on a rational and strategic basis.

Again, there simply is no set of rules by which the U.S. society deals with the issue of new-crop development. In the absence of reasonable expectations, it is difficult, if not impossible to convince diverse sectors of private and public organizations to participate in joint ventures of new-crop development. New-crop activities have a well-deserved reputation of being 'here today, and gone tomorrow'.

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[7] The issues during 1957-1961 contain much information concerning efforts during that era to promote the development of new crops in the U.S.

Ruttan[8] stated that 'institutional innovation is both a more powerful and a more reliable instrument of reform than technical change.' Yet frequently, attempts are made to solve an institutional problem by the use of technology. The reason for this temptation is clear: it is politically easier to deal with inanimate technology than with vested interest groups resistant to institutional change. The 1938 Agricultural Adjustment Act provided for technological development of new uses for surplus crops, and to discover potential new crops. It did not, however, make the institutional change needed to eliminate the political inability of the USDA to fully develop new crops for profitable use on America's farms.

Another example of trying to use technology to solve an institutionally based problem is evidenced by the nature of the provisions in an early version of S 970 in the 100th Congress. S 970 focused on the application of technology, the currently popular biotechnology in particular. The focus was obviously on technology within the existing organizational structure, because the bill required that at least half of the funds be spent on biotechnology. If the commitment had been to the development of new crops needed by America's farmers, taxpayers, and consumers, the funds would have been authorized to be spent to meet that objective. In the latter scenario, it should be possible to spend anywhere between 0 and 100% on biotechnology, based on crop development objectives.

S 970 originally resembled a bill to subsidize a commitment of higher education to research in biotechnology. Whether or not that is the case, widespread bankruptcies in private biotechnology firms, suggest that during the past decade or so, many people in the U.S. became financially overextended during the ebb and flow of biotechnology 'mania'.

Furthermore, the early version of S 970 clearly advocated using the funds to work on commodities currently in surplus. Some of that work might be justified. But the point I make is, that this type of legislation, like the Agricultural Adjustment Act of 1938, and apparently everything in between, simply allows the existing organization structure to continue. That structure is politically hostile to new-crops research because of its passive nature concerning new-crops development.

The high cost of chronic agricultural surpluses and acreage diversion programs justifies immediate national attention to strategic planning and the development of new crops. The need to diversify the crop plant base from which the U.S. generates its annually renewable wealth is urgent. The technological tools and plant resources are available, but as yet, neither adequate federal appropriations nor a sufficiently forceful Congressionally authorized management entity has been forthcoming. The Foundation for New Farm and Forest Products has been proposed as an essential

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[8] Ruttan, V. W. 1982. Agricultural research policy. Univ. of Minnesota Press, Minneapolis, MN.

institutional change for orderly development and commercialization of profitable new crops for diversification of U.S. agriculture[9].

The primary recommendation to the Secretary, United States Department of Agriculture, from the New Farm and Forest Products Task Force[10] was the establishment of a Foundation for New Farm and Forest Products. The Task Force considered the establishment of an independent organizational entity, dedicated to the achievement of agricultural diversification to be absolutely vital.

'As a general principle, any substantial goal can only be achieved if a properly structured and supported organization is established with a dedicated mission, and adequate resources, to reach the goal. Such an entity must be established in a framework which enables it to be not only independent (although highly accountable), but also credible and effective in both the private and public sectors. It must necessarily establish itself as a central focal point, advocate, and catalyst for new farm and forest products. To this end, the Task Force strongly recommends establishment of the Foundation for New Farm and Forest Products'[11]

The task force report[12] presented detailed recommendations concerning the Foundation for New Farm and Forest Products with respect to:

1) Organization and Structure
2) Mission and Purposes
3) Role and Operations
4) Funding
5) Building Blocks for the Foundation

In conclusion, I believe that:

1) Ample evidence supports the notion that the funding mechanism for effectively developing new-crops in the U.S. is necessarily a new type of organizational entity which is substantially free from the very strong forces of established agricultural politics.

2) Funding of individual projects should be done on a joint-venture basis. State legislatures, universities, private firms, consortia, venture capital groups, USDA-Agricultural Research Service, and other organizations should share at least half, and preferably two-thirds of the funding.

Thank you once again for the opportunity to share these thoughts and observations. This is a complex and difficult topic.

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[9] Jolliff, Gary D. 1989. Strategic planning for new-crop development. J. Prod. Agric. 2:6-13.

[10] June 25, 1987, Washington, D.C.

[11] Quote from page 29 : New Farm and Forest Products Task Force. 1987. New farm and forest products: Responses to the challenges and opportunities facing American agriculture. USDA Office of Grants and Programs Systems, Washington, D.C.

[12] pages 29-35

I trust that you understand my focus is on 'the system' and not on individuals within the system. I have many good friends within USDA. I do not perceive that there is an individual villain.

I would be pleased to respond to further questions. I wish to convey my best wishes to each of you, as you deal with this very difficult task. As you know, in this country we live by the golden rule -- 'He who has the gold, rules.' I am confident that you will rule on behalf of the taxpayers, consumers, and farmers.

Good Luck!

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New Crop Development: Opportunity and Challenges

Gary D. Jolliff* and Sieglinde S. Snapp

The development of new, profitable crops for U.S. agriculture would address: 1) the challenge to produce more marketable products using lower inputs and under harsh conditions; 2) the continuing crisis of crop surpluses; 3) the unstable economic situation facing growers; and 4) the unfavorable balance of trade. Available new crops that hold promise include oil-producing, wild plant species; ancient food crops of the Inca empire, and high fiber crops for pulp production. In contrast to the promise inherent in potential crop species, efforts to develop new crops have been intermittent. We will explore the challenges facing new crop development through discussion of a decision-matrix approach to problem identification. Our experience with meadowfoam, a new agronomic plant, illustrates critical stages in new crop development. Analysis of Canadian rapeseed and U.S. soybean development rounds out a discussion of successful approaches in new crop development. The need for alternatives to overproduced crops has never been greater. A new era in agriculture is possible, based on the comprehensive development of our genetic plant resources; however, it will not arrive without substantial investment in new crop development.

Additional index words: **Alternative crops, Special crops, Industrial crops, Future crop development, Agricultural research policy, Agricultural diversification, Strategic materials.**

NEW CROPS have been the foundation of U.S. agriculture. Early colonial farmers were experimenters, evaluating and selecting among crops from the Old World and the New. The development of wheat production is illustrative of this process. Wheat was new to North America at the beginning of the colonial period, yet it quickly became the primary commercial crop of the middle colonies (21). Consumers around the world are indebted to such crop pioneers as the first Midwestern corn growers, and the developers of soybean from insignificance into today's multi-billion-dollar agribusiness (G.D. Jolliff, 1986, unpublished data). The resounding success of the U.S. productive capacity for such crops as corn, wheat, and cotton is underscored by the devastating economic impact of current overproduction. The development of alternatives to overproduced crops would not provide instant solutions to current economic ills. However, we contend that the future holds opportunity for innovative policy makers, researchers, developers, and producers of new crops (G.D. Jolliff, 1986, unpublished data; 28).

Gary D. Jolliff and Sieglinde S. Snapp, Dep. Crop Science, Oregon State Univ., Corvallis, OR 97331. Oregon Agric. Exp. Stn. Tech. Paper no. 8064. *Corresponding author. Received 1 Dec. 1986.

Published in *J. Prod. Agric.* 1:83-89 (1988).

Modern agriculture is based on a limited number of crops. Less than 20 crop species provide over 90% of the world's food (28, 31). Dependence on relatively few crop species increases the vulnerability of producers to environmental and economic fluctuations. The expansion of available plant sources for industrial feedstocks and, thus, increased agricultural diversity, has been widely recommended (11, 13, 17, 18, 22, 26, 29). Underuse of our plant resources may have serious economic consequences for American agriculture if the situation is not swiftly remedied.

The potential benefits to be derived from expanded cropping choices are illustrated by the development of soybean in the USA and rapeseed in Canada (13, 16, 25). Crops diversity has also been proposed to improve pest control, increase soil conservation, and improve the national balance of trade (13, 26).

New crop development, as discussed here, includes the agronomic development and domestication of wild plant species, as well as the adaptation of established crops to new production areas. Recent reviews by Hinman (6) and by Vietmeyer (28) document thousands of plant species that have been identified as potentially important commercial crops awaiting further investigation. Further, tens of thousands of plant species remain unevaluated; the potential for discovering new drug, food, feed, industrial feedstock, fuel, and fiber supplies is vast (1, 18, 31).

The potential of new crops is suggested by the greater than 300% improvement in U.S. corn yields since the beginning of this century (Fig. 1). The development of new crops requires a substantial investment of resources in carefully chosen plants; however, the return in agronomic improvement can be quite high. Evenson et al. (5) estimated the rate of return (over the last 100 years) for public funded agricultural research to be about 85% annually.

This article addresses methods to effectively use our renewable agricultural resources. We explore the challenges facing new crop development through historical and current examples. Finally, we discuss possible directions for new crops in the USA.

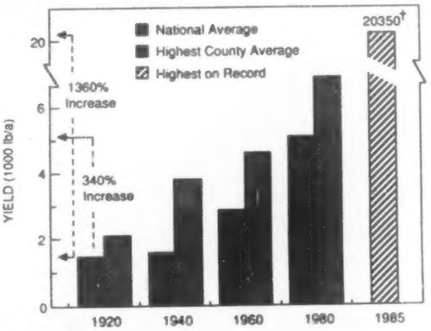

Fig. 1. Corn yields in the United States, 1920–1980, based on national and highest county averages from U.S. Census of Agriculture Summary data, 1921–1981. † The highest on record from a farmer's field was reported by W.L. Nelson and H.F. Reetz Jr. (Herman Warsaw's high corn yields) in the June–July 1986 Crops and Soils magazine. 38(8):5–7.

NEW CROPS FOR U.S. AGRICULTURE

New crops could potentially contribute most to U.S. agriculture through industrial applications, specialty food products, and low-input farming (13, 26). A number of potential new crops for American agriculture are presented in Table 1. Industrial feedstocks could rely on a wide variety of annually renewable farm products (1, 10, 19, 29). For example, jojoba oil could substitute for sperm whale oil as an important industrial lubricant (7, 8); crambe oil could serve as a base for new coatings and plastic treatments (26); and meadowfoam oil has unique properties not yet fully exploited (29). Specialty food items such as cashew nut, tropical fruit, popping bean, and numerous low-fat, low-cholesterol plant products could also expand new crop production (13, 26, 28). Plant-derived biodegradable herbicides, new medicines, reduced urban lead levels (from ethanol-enhanced gasoline with reduced lead content), and soil-conserving cover crops are a few of the society-wide benefits that could be derived from the development of alternate crops and new crop products (13, 15, 18, 26).

To be competitive, U.S. growers are increasingly challenged to use inputs more efficiently and to make marginal cropping environments productive (2, 7). Producing crops under relatively harsh conditions, such as high salinity, low water availability, and low nitrogen regimes present challenges that might be addressed utiliz-

Table 1. Examples of new crop products.

Example products	Crop sources
Lubricating Oils Waxes Cosmetics	Jojoba Meadowfoam Crambe
Herbicides Insecticides	Sunflower Pyrethrum
Rubber Waxes	Guayule
Fiber Pulp	Kenaf Poplar
Soaps Lubricants	Cuphea Guar
Plasticizers	Soybean Crambe Rapeseed
Resins Coatings	Soybean Guayule

ing new crops (28). A new generation of well adapted crop varieties tailored for maximum yields under local conditions can be envisioned.

Specific examples of potential new crops adapted for arid and semiarid regions include: buffalo gourd (2, 6, 8), jojoba (6, 7, 8, 13), and guayule (13, 27). The buffalo gourd is a water-conserving source of starch, biomass, and forage (2). Salinity trials and evaluation of buffalo gourd seeds as a possible source of liquid fuel are in progress (6, 10). Jojoba is a replacement candidate for sperm whale oil to supply liquid wax esters (10). Jojoba meal has also been proposed as a domestic source of tannins (6), an example of a potential new crop which could replace imports with domestic production. Guayule, a bushy plant native to the arid southwest, could potentially supply the strategic rubber needs of the USA (27). Arid land in California, Texas, Arizona, and New Mexico could become a center for rubber production. In the 1940s, guayule rubber yields were on a par with yields from rubber trees (27). Over the last 40 years, agronomic research has dramatically increased rubber tree yields, in contrast to guayule yields. A renewed interest in developing guayule as a domestic supplier of natural rubber has been spurred by an increased awareness of the need for domestic control of strategic defense materials (13, 27).

Kenaf is a promising, annually renewable source of fiber (13). The demand for fiber crops to supply pulp for making paper and paper products is steadily increasing (26). Kenaf can be grown in much of the nation south of Iowa. Yields of over 15 tons of stems per acre could allow this crop to compete with pulpwood and to provide a viable cropping alternative to surplus crops such as cotton (13, 18). Since it is annually renewable, kenaf provides greater flexibility in the use of land, and allows forests to be preserved for multiple recreational uses.

Paddy wild rice is a crop still not completely domesticated; nevertheless, it is in commercial production (13). An expanding market provided by rapidly changing diet preferences of U.S. consumers is insuring continued growth in wild rice production (13).

Plants selected for development into commercial crops deserve careful evaluation. Potential new crops typically have traits that can cause immediate developmental difficulties. Cuphea, for example, is a possible domestic source of lauric acid for production of soaps and related products (24). Cuphea has a number of undesirable agronomic traits, such as shattering seeds and sticky hairs, that complicate harvest (13). A substantial research investment is required to develop an agronomically manageable crop from a wild plant such as cuphea. Crops with seemingly desirable agronomic traits must also be carefully evaluated: they can be the source of unexpected problems upon release. Kudzu is a classic example. Promoted for its soil conservation and forage potential, kudzu has overgrown large areas of the South and become a major weed problem (13). A sustained commitment from the public sector to evaluate and develop new crops would minimize risks of premature introduction of new crops.

The depth and variety of untapped resources for U.S. agriculture have been touched on here. However, public sector investment in new crop development has historically been low and has fluctuated drastically, reflecting shifting research priorities and patterns of research emphasis on the further development of established commodities (G.D. Jolliff, 1986, unpublished data). A strong, sustained voice speaking for new crops has been lacking (17). If benefits from new crop development in the USA are to be realized, changes in national research priorities may be required. With total federal and state funding of agricultural research at its current low level, it is difficult to envision an adequate source of funds for research and development of new crops.

CHALLENGES IN NEW CROP DEVELOPMENT

The complex, all-inclusive nature of new crop development has been a major barrier to development efforts. The failure of just one factor in the equation, such as lack of access to appropriate processing facilities, can spell disaster for the success of a new crop industry (3). The demonstration of profit potential in a new crop may drastically alter its outlook, should entrepreneurial zeal be directed at removing barriers to full production (G.D. Jolliff, 1986, unpublished data). However, to adequately develop a new crop to the point where the potential for profit is demonstrable, a complex matrix of factors must be characterized and challenges overcome.

The commercial success of a new crop demands an orchestration of development for up to 40 different factors, from availability of high quality seed to maximum market penetration (13). A decision matrix of criteria has been developed to assist in the identification of critical factors affecting the development of a new crop (Table 2). A simultaneous assessment of relevant factors, from production to consumption, is useful in contributing to an understanding of possible limiting factors (3). Further, inappropriate new crops for an area can be more easily identified and rejected using a decision matrix approach.

A decision matrix can be designed to categorize the resources in the area under consideration while simultaneously assessing the characteristics of different new crops. As modified from Knox and Theisen, Table 2 presents important steps in production, processing, and marketing of a new crop to be considered. We will discuss some crucial steps in this decision matrix as illustrated by our experience with meadowfoam in the Pacific Northwest. Meadowfoam is being developed to produce an agronomically viable crop from a wild plant species (12). Its seeds are a source of long-chain fatty acids, a new industrial feedstock for which the market has not been fully defined (19, 29).

The situation into which a new crop is to be introduced, or for which it is to be developed, must be considered first. A meticulous cataloging of the land, water, and climate resources is useful in clarifying crop alternatives (Table 2). The physical land and climate must be further characterized as modified by the economic climate (Table 2). Consider, for example, which land resources are cur-

Table 2. Decision-matrix for new crop development (modified from Blase et al., 1981).

Component description	Physical presence	Economic climate
PRODUCTION RESOURCES AVAILABLE		
Land Resources		
Water Availability		
Climate Attributes		
Input Procurement and Availability		
Seed		
Fertilizer		
Farm Labor		
Farm Equipment		
Pest Control		
Production Expertise		
Crop Organizations		
Agricultural Research Programs		
Market Information for Farmers		
PROCESSING AND MARKETING		
Potential for Dependable Supply		
Procurement Resources and Financing		
Government Services and Regulations		
Market Intelligence		
Transport and Storage Facilities		
Processing		
Resources		
Equipment		
Research		
Information Programs		
Commodity Institutions		
Market Penetration		
Market Size		
PLANT CHARACTERISTICS		
Adaptation to Environment		
Production Level		
Expertise Required		
Inputs Required		
Market Development		
Product Versatility		
Competition with Domestic Supply		

rently underutilized. A new crop with a short growing season could potentially expand land use by facilitating doublecropping (6). Introduction and development of a new crop could allow more efficient use of land with limited rainfall, or allow use of high saline irrigation water (13). If land is in high demand for economically viable crops, then development of alternate crops may be less feasible, or necessary, for an area.

Growers in Oregon's Willamette Valley lack cropping options. Production on poorly drained soils has been limited to annual ryegrass seed. Alternatives to annual ryegrass are needed to diversify the economic base and to decrease the incidence of field burning, a process integral to grass seed production, but the focus of public controversy. Meadowfoam, an herbaceous winter annual native to North America, has potential as an oil seed crop to be grown on the targeted soils (13). Wild meadowfoam species grow in wet habitats and are well adapted to production on poorly drained soils in the Willamette Valley (12).

New crop development is affected by the availability of inputs, such as appropriate herbicides, and factors such as the necessity to invest in new equipment (3). The financing environment for investment in production of a new crop, and the farming expertise that could apply to it, both have a strong influence on the potential for successful development. A factor contributing to the strong candidacy of meadowfoam as a new crop for the Willamette Valley was the selection of upright plant growth habit with high seed retention ability. It is harvested with the same equipment already used for grass seed (10).

Processing facilities, transportation, and marketing have been cited as steps in the new crop development process which can act as bottlenecks to the success of a new crop (3, 13). For example, if a new crop requires specialized processing equipment it must be either transported to where this equipment is available, or facilities must be built near the crop production area. Available transportation and processing facilities must be carefully considered in light of the characteristics of the new crops under consideration. Some products are relatively stable, with excellent storage and transportation qualities, which reduces the importance of proximity in processing plants. Routine extracting and processing techniques have been used to produce high quality oil from meadowfoam seed. The oil content and stable qualities of meadowfoam seed have made the location of processing facilities a relatively minor concern in meadowfoam's development. By contrast, this can be a major stumbling block for highly perishable crops such as kenaf, which requires production close to pulp processing plants (23).

The market for a new crop product is a crucial ingredient in successful development efforts (3, 11, 13, 29). An available or readily developed market provides a major incentive for solving problems in production, processing, and transport. However, if there is a well developed market, competition with existing domestically supplied products becomes a factor to consider. An ideal new crop would supply either a product currently imported, or a new item for consumption. Meadowfoam is a source of long-chain fatty acids not yet fully exploited as a unique industrial feed stock (12). This is its greatest challenge. Potential use, rather than well developed current uses, is a stage that can be difficult to overcome.

Once an adequate market is assured, then questions of sufficient and reliable supply arise. Meadowfoam production in the Willamette Valley is assisted by the presence of the Oregon Meadowfoam Growers Association (OMGA), which could facilitate the smooth scale-up of meadowfoam production should market demand improve (29). An exclusive release by the Oregon Agriculture Experiment Station of 'Mermaid', the first commercial meadowfoam cultivar, to the OMGA provided an incentive for undertaking the market and production development work. Protection of the OMGA proprietary position will likely influence meadowfoam development in the future.

There are many steps in the network that support production, processing, and marketing of established crops. Establishing all of these steps in new crop development is an exercise in coordination. A decision-matrix approach

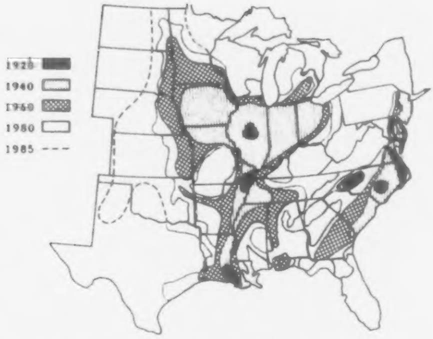

Fig. 2. The expansion of soybean production in the United States during the present century. The acreage for the reported 1985 expansion might be limited in some areas. The map was drawn on the basis of information compiled from the U.S. Bureau of Census and the USDA Statistical Reporting Service.

can help pinpoint factors limiting development at any one point. The challenge then is to identify appropriate new crops for development and to apply a concentrated effort to promote improvement in limiting areas.

SUCCESSFUL NEW CROPS

The development of U.S. soybean production from a minor forage crop to the multi-billion dollar oil crop of today illustrates the challenges and opportunities facing new crop development (Fig. 2). How did the dramatic growth in importance of soybean to the U.S. farmer come about? Acute shortages of vegetable oil during World Wars I and II were accompanied by skyrocketing soybean prices (Fig. 3). Soybean became suddenly profitable, even though the available varieties were low-yielding. This crisis situation was the incentive that pushed soybean over the "entry barrier" faced by new crops and initiated the commercialization process. A few dedicated advocates also played an important role in promoting soybean to its current prominence (13). Considering that soybean was introduced to the USA over 200 years ago (9), the development of its production has not been expeditious. However, the rapid success of the crop once it became a profitable alternative for growers is clear (Fig. 2).

Development of the Canadian rapeseed industry bears striking similarities to soybean development in the USA, but also some insightful differences. The Saskatchewan Wheat Board recognized the need for cropping alternatives for wheat growers (30). Canada committed over 200 Scientist Years (SY, where an average SY is equivalent to approximately $200,000 Canadian) over a 30 year period to rapeseed breeding and genetics (E.J. LeRoux, 1986, personal communication). New varieties were developed for edible oil production. This example demonstrates the potential for a relatively focused investment strategy to overcome the entry barrier to new crop development.

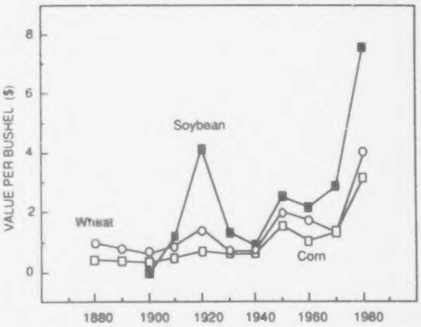

Fig. 3. Commodity value per year for wheat, soybean, and corn, 1880-1980, according to the U.S. Census of Agriculture Summary data, 1880-1981.

Either a scarcity situation such as described for U.S. soybean development, or a planned, sustained research-investment approach such as exemplified by Canadian rapeseed development can boost a new crop over the entry barrier. Once a new crop can be grown profitably, challenges such as unique processing requirements or marketing problems will be addressed by both the private and public sectors. By contrast, public support of research is required for initial development of a new crop (G.D. Jolliff, 1986, unpublished data; 12). At the point where adequate rates of return on investment can be projected within a short time, the development risk becomes quantifiable and the private sector can be expected to address further development needs (Fig. 4).

The enormity of the entry barrier facing new crops must be recognized. It is easy to develop unrealistic expectations of new crops. Development of a crop to the profitable stage requires an intensive, sustained effort (G.D. Jolliff, 1986, unpublished data). The slow commercialization of U.S. soybean production (Fig. 2) illustrates the long-term view that is needed to set realistic expectations for new crop development. However the potential exists, with available technology, to achieve rapid progress in such development. The successful commercialization of rapeseed in Canada demonstrates the effectiveness of a concentrated research effort (16, 25, 30). A relatively modest investment in 1952 of about 1.4 SY (in rapeseed genetics and plant breeding) per million dollar rapeseed value initiated the development of Canadian rapeseed at an unprecedented rate (Table 3). In contrast, compare the .01 SY per million dollar soybean value invested by the U.S. public sector in soybean breeding and genetics research for the same year (Table 3).

What are the overall societal benefits incurred from a successful new crop development program? The Canadian rapeseed venture is a dynamic example of sustained support by established commodity producers for the development of new cropping options. A recent assess-

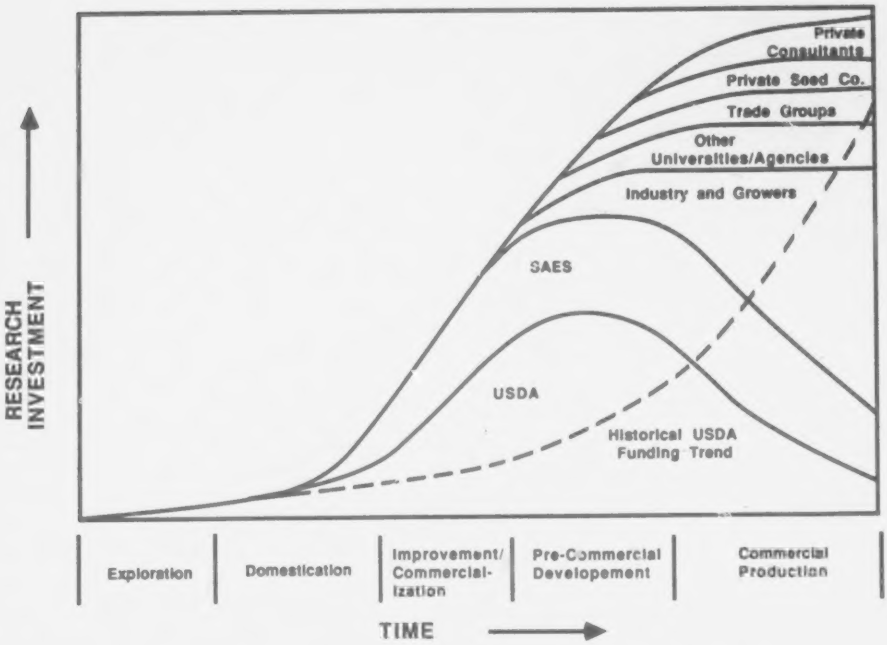
RESEARCH INVESTMENT
Private Consultants
Private Seed Co.
Trade Groups
Other Universities/Agencies
Industry and Growers
SAES
USDA
Historical USDA Funding Trend
Exploration
Domestication
Improvement/ Commercial-ization
Pre-Commercial Developement
Commercial Production
TIME

Fig. 4. Model of research investment strategies to support commercial development of new crops.

ment estimated the annual internal rate of return on investment in rapeseed at 101% (16). Consumers and society-at-large benefited equally from increased rural prosperity, from a positive balance of trade, and from greater availability of locally produced edible oil (16). Canadian development of rapeseed as an alternate crop significantly stabilized grower income.

THE FUTURE OF AGRICULTURE: NEW CROPS' ROLE

A future U.S. agricultural scenario, involving full use of our nation's capacity to produce an excess of annually renewable farm products, can be envisioned. For example, farmers in the Southwest might grow a variety of water-conserving, low input plants such as buffalo gourd for starch and jojoba for industrial oils (2, 6, 27). Wetter areas in the South might produce tallow from the Chinese tallow tree and pulp from fiber crops such as kenaf (13, 23, 29). Fields of cuphea for soap manufacture, and super-sorghum as a feed-base for industry and fuel, can be envisioned in the Southeast (4, 24). Midwestern fields of corn might be intercropped with a nitrogen-fixing, weed-suppressing, and soil-conserving legume. A short-season crop such as crambe might be doublecropped with wheat in the North Central states (29). On the West Coast, locally adapted cultivars of small grains and turf grasses (for seed) might be grown in rotation with industrial feedstock crops such as meadowfoam and pyrethrum (15, 19).

American agriculture, safeguarded by the expansion of cropping options, would utilize soil and water resources more efficiently. Further, strategic industrial feed-stocks would be produced under U.S. control, con-

Table 3. Comparison of USA and Canada public sector investment in soybean and rapeseed development, respectively (25; R.W. Judd, 1986, personal communication).

			Public geneticist/breeders			
	Crop value (million $)		Scientist Years (SY) (no.)		Ratio (SY/million $)	
Year	U.S. soybean	Canada rapeseed	U.S. soybean	Canada rapeseed	U.S. soybean	Canada rapeseed
	U.S. currency	Canadian currency				
1952	750	0.21	7.3	0.3	0.010	1.428
1962	1 544	20	13.0	1.5	0.008	0.075
1972	3 560	168	26.0	8.5	0.007	0.051
1982	12 000	514	32.0	15.8	0.003	0.031

tributing positively to the balance of trade. Improved productivity and increased stabilization of farm income and farm soil might be expected from the widespread availability of profitable, locally adapted cultivars. Underutilized harsh environments could be made competitively productive.

Methods of accelerating development of profitable new crops for U.S. agriculture need to be explored. Biotechnology could play an important role in developing cropping alternatives (14). Documenting existing genetic variation would also expand the range of new farm and forest products (28, 31). However, tools such as biotechnology and evaluation of existing genetic diversity may not necessarily be used effectively. It has been argued that institutional reform can be a reliable means of bringing about needed change (20). The establishment of a dynamic, multidisciplinary, entrepreneurial foundation focused on new farm and forest products has been proposed recently by a national task force (17). Members of industry, government, academia, and production agriculture, working together in a collaborative, multidisciplinary approach have an opportunity to foster accelerated new crop development (13, 17).

The benefits for consumers and producers alike from the improvement of cropping alternatives cannot be ignored. Our renewable agricultural resources are only beginning to be tapped. Useful first steps would include a realization of the complexity involved in new crop development—such as identified in the decision-matrix approach, and implementation of a unified, can-do attitude throughout agriculture. Hopefully, substantial and responsible research in new crop development is forthcoming.

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Strategic Planning for New-Crop Development

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The high cost of chronic agricultural commodities surpluses justifies immediate national attention to strategic planning and the development of new crops. The need is urgent to diversify the crop plant base from which the U.S. generates its annually renewable wealth. The technological tools and plant resources are available, but as yet, neither adequate federal appropriations nor a sufficiently forceful Congressionally authorized management entity has been forthcoming. The Foundation for New Farm and Forest Products has been proposed as an essential institutional change for orderly development and commercialization of profitable new crops to diversify U.S. agriculture.

THE U.S. government spent more than $200 billion between 1978 and 1987 on domestic programs related to surplus agricultural commodities (Fig. 1) (54). These outlays, for such things as commodity price supports, export programs, and farm credit bailouts, together with record numbers of farm bankruptcies, suggest a policy-stimulated over-concentration of U.S. agriculture on a few primary commodities.

Excess production capacity abroad, such as in the European Community, has aggravated the problem. Also, wheat production in Bangladesh, for example, increased tenfold between 1971 and 1981 (7); and U.S. agricultural exports to China dropped precipitously between 1981 and 1986 as the agricultural output of the country increased (35). The director of the Illinois Agricultural Experiment Station, Donald A. Holt, recently cautioned, "We may be in danger of underestimating the ability of other nations to develop and apply agricultural technology effectively. For over a hundred years we have had little competition from the primitive agriculture of much of the world. That situation is rapidly changing."

The biotechnology industry somewhat paradoxically has contributed to the problem as well. One biotechnological product, for example, enhances livestock productivity, thereby reducing the quantity of feed required to market animal products. The projected decrease in feed demand would add an estimated 3.4 to 10 million acres of excess crop production to U.S. agriculture (27), expanding excess crop production capacity—already estimated (53) at 40 million acres— by 9 to 25%. Yet biotechnology could be applied to improve new crops for profitable production of industrial raw materials—which are now imported—instead of producing more surplus commodities.

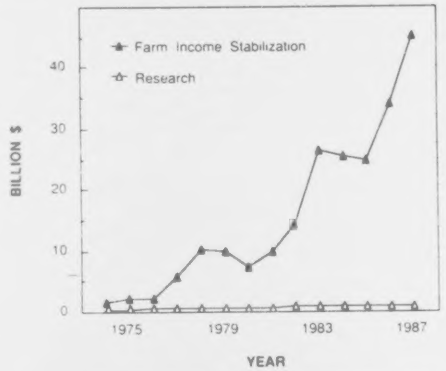

Fig. 1. Federal outlays for farm income stabilization (FIS), and for research in the USDA. FIS values are from Function 351 (Budget of the U.S. government) from 1974 to 1982, and Function 351 plus the value of certificate programs [such as $9.7 billion in 1984 for the Payment-in-Kind (PIK) commodity program] from 1983 to 1987. USDA research is Function 352 minus services (1974-87). (S. Dewhurst, 1988, personal communication.)

The use of biotechnology in agriculture is somewhat analogous to the employment of robotics in manufacturing. While manufacturing efficiency may be greatly improved, total national health and economy could experience severe impacts from labor displacement and insufficient alternatives for productive reemployment. The solution, for both industry and agriculture, lies in diverting resources to new products and services with elastic markets. In much the same way that displaced workers have been retrained, sufficient investment to develop new crops can help convert the excess U.S. agricultural production capacity to serve society better.

As existing federal policies have stimulated overproduction, so new policy directions are needed to help insure competitiveness of U.S. agriculture in the commodity markets of an increasingly self-sufficient and productive world. The forces involved in making needed institutional change have been described and discussed by Ruttan and Hayami (43), who write: "How costly a form of institu-

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tional change is to be accepted in a society depends on the power structure among vested interest groups. It also depends critically on cultural tradition and ideology, such as nationalism, that make certain institutional arrangements more easily accepted than others."

While agriculture is the largest single contributor to the U.S. economy, and arguably a very efficient industry (Lesher, W.G. 1984. Unpublished data from a speech presented at the Conference on Alternative Agricultural and Food Policies and the 1985 Farm Bill, Berkeley, CA. 11 June.), given the chronic nature of surpluses, scientific production of only the major crops may no longer be enough. Farming, which constituted only 11.3% of the agricultural sector contribution to gross national product (GNP) in 1982 (39), needs a boost in economic return. New industrial crops and products could cycle within the domestic economy as value-added commodities, generating GNP at rates equal to, or greater than, GNP generation by subsidized commodities currently produced in surplus and exported with little, or no, modification. Survival in the world market of today requires a renewed attentiveness to one of the original Congressional mandates to the USDA: to study "new and valuable plants and seeds" (5).

In spite of this clear mandate, historically powerful vested coalitions and diverse individual attitudes have limited the ability of the nation to reallocate scarce public funds within agriculture, or to acquire new funding for research and development of new farm and forest products (45).

After the agricultural commodity surplus crisis of the 1950s, a modest infrastructure for new-crops research was developed within the USDA (28). Redirection of new-crops funding to other research areas dismantled this program during the few years when dominant crops were highly profitable (I. Wolff, 1986, personal communication). Such political vulnerability must be avoided through appropriate institutional innovation and strategic planning. Currently, the long-term support of high-risk ventures in the development of new crops are not represented adequately in the U.S. Congress. However, congressional action will be required to activate needed institutional changes and such efforts will require keen statesmanship.

Visionary leaders have suggested an interdisciplinary approach in creating and operating such institutions (3, 20, 32). Specialists are needed for germplasm collection, genetics, breeding, agronomy, physiology, pest management, crop modeling, processing, use, economics, and marketing. Institutional models for this type of multidisciplinary effort do exist. A cooperative approach at the International Rice Research Institute in the Philippines has, in 25 years, yielded gains in world rice improvement that compare favorably with advances realized during the previous 5,000 years (24). The rate of crop improvement in highly domesticated plants such as rice underscores the potential for developing other plants as new crops.

While the U.S. has lacked a national organizational focus in new-crop development in recent decades, the dramatic improvements in both established crops and in crops recently expanded in the U.S. during the past half century (soybeans, safflower, sunflower, grain sorghum, kiwi, jojoba, wild rice) indicate substantial gains are possible from new-crop development efforts (26, 28, 34). "The greatest service which can be rendered any country," Thomas Jefferson observed, "is to add a useful plant to its culture" (12).

NEW FARM PRODUCTS

What constitutes "usefulness" has broadened considerably since Jefferson's time. Today, consumer needs that could be met through the use of U.S. agricultural resources include plastics, cosmetics, gasoline and lubricant additives, insecticides, medicines, paper products, super absorbent polymers, and foods low in fat and cholesterol (1, 28, 44, 52). In addition to substantial economic benefits, new crop development could address a wide variety of environmental concerns. For example, health hazards could be reduced by using vegetable oil to replace petroleum-based plasticizers in industry. Plant-derived lubricants that substitute for sperm whale oil could be developed. Ethanol from biomass could be used to a greater extent as an efficient motor fuel in no-lead gasolines to reduce urban lead levels and control atmospheric carbon levels. Perennial crops could replace annual crops on highly erodable land (26, 28, 37, 52).

Moreover, many strategic and essential substances or plant-derived substitutes could be grown in the U.S. Where natural rubber, castor oil, and sperm whale oil must be stockpiled for defense purposes (52), domestic production of new crop candidates—such as guayule to supply natural rubber, and jojoba as a source of liquid wax esters—would help insure availability of these strategic materials (1, 26). Furthermore, new crops could supply essential industrial materials—waxes, resins, gums, newsprint, lubricants, and alternative sources of hydrocarbons used in manufacturing numerous synthetics (48, 52). However, the greatest opportunity for new agricultural products lies in applications which do not substitute for, or compete with, current agricultural products, but do create totally new markets. Meadowfoam (*Limnanthes* spp. R. Br.), a new source of unique long-chain fatty acids, is a case in point (44, 56).

Increased efficiency of producing resources, such as the use of potentially lower cost high fructose sweeteners from corn to replace cane and beet sugars, could benefit society (even though corn also is subsidized). At the same time, however, such changes could reduce dramatically sugar crop acreage and spell disaster for cane and beet sugar growers. Thus, strategic planning and a long-term national commitment to buffer the effects of crop acreage displacement by the introduction of new replacement crops clearly are justified.

Soybean introduction and commercialization on 40 to 60 million acres of corn, wheat, and cotton land in the U.S. (28) is illustrative of this. Though interest in soybean as an oilseed crop in the U.S. was very limited in the early 1900s, the crisis of domestic vegetable oil shortages during WWI drove up the price of soybean in 1920 to more than $4/bushel (26). Both the crisis-born profit potential and the strong, enduring, and accountable voice of W.J. Morse, director of soybean research in the USDA, served to break the new-crop entry barrier and transformed soybean into a "Cinderella" crop. In 60 years since 1925, soybean had a total, inflation-adjusted, farm-gate cash value of $188 billion (2, 50). The larger benefit to the nation's economy, assuming a multiplier of 2.75 to project economic activity (10), is estimated at $518 billion. Today, however, this "miracle crop" may become just one of the surplus commodities in some U.S. farming regions. As soybean prices decline because of domestic overproduction and foreign competition, thousands of farmers, having no profitable alternative crops, may become trapped.

The history of soybean production has a threefold significance: it illustrates the economic potential latent in experimental crops; it underscores the role of a strong political voice in directing public resources to crop development; and it points to the crucial necessity of an ongoing, long-term commitment to new-crop research that can dampen future cycles of agricultural overproduction.

ECONOMIC PAYOFFS

What is the potential for the development of new crops into profitable alternatives? While new farm and forest products should not be viewed as quick or complete solutions to the problems of surplus agricultural commodities, there are substantial grounds for optimism. The historical development of two major, long-domesticated U.S. crops—corn and soybean—provides models of how plant productivity can be increased to benefit society. During the 20th century, average U.S. yields of corn and soybean increased three-fold (Figures 2 and 3) (50), with about half of this increase due to plant-breeding efforts alone (6, 8, 16, 38). At the same time, the labor required to produce corn in the U.S. in 1986 was approximately one-fiftieth of that needed in 1910 (50).

Similar efficiency and even higher rates of yield improvement could be expected as successful alternate crops and products are developed. Yield improvement in particular is a critical first step in making new crops profitable, as are the promotion of positive attitudes and support for sustained research and development. One example is the 14-yr investment made by Canada in developing rapeseed (canola). One analysis estimated a 101% annual net return to society, with benefits divided about equally between producers and consumers (31). Successful investments in new crop development serve producers through improved income, consumers through lower cost and higher value commodities, and investors through added national wealth (14). Canola has become a major export earner for Canada.

INVESTMENT LEVELS NEEDED

Realistic expectations from research on new crops, and for corresponding support levels, are needed. The development of historical timetables and investment levels for the improvement of established crops would be most effective. Low levels of investment in new-crop research prevail and usually lead to long-lasting disappointments. An estimated 3,000 to 6,000 scientist-years of publicly-funded support were invested individually in corn and soybean between 1920 and 1985 (51). During this time the yield of each crop increased threefold. A scientist-year (SY) is the total cost for a full-time scientist, with support staff, supplies and services, and equipment for 12 months. Currently corn, soybean, wheat, and cotton combined receive over 1200 SYs of public research (Fig. 4) (51). The total annual cost per SY of a well funded program ranges from $150,000 to $225,000 (15, 19, 47, 51, E.J. LeRoux, 1983, unpublished data from speech

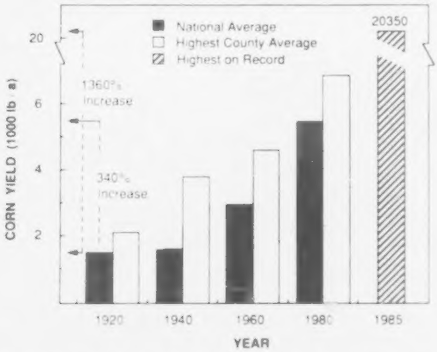

Fig. 2. Corn yields in the USA (26, 33, 50). National 10-year averages were derived from USDA statistics (1936, 1945, 1965, 1985). Highest county averages are from U.S. Census of Agric. Summary Data for the closest available years (1924, 1939, 1959, 1965, 1985).

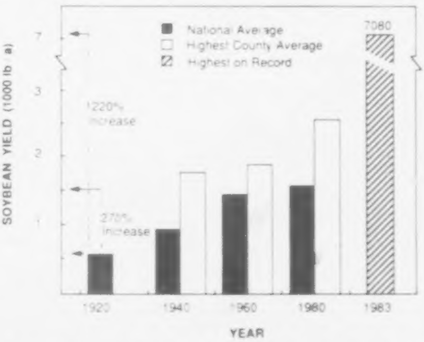

Fig. 3. Soybean yields in the U.S. (17, 50). National 10-year averages were derived from USDA Agric. Statistics (1936, 1945, 1965, 1985). Highest county averages are from U.S. Census of Agric. Summary Data for the closest available years (1924, 1939, 1959, 1965, 1985).

delivered to Canola Council Funding Meeting, Winnipeg, Manitoba, Canada. 22 Nov.), with additional start-up costs averaging $453,000 for facilities and equipment (15). Public-funded projects on new crops seldom get average or greater funding for continuing or start-up costs. The average total public-funded research cost to increase yields threefold would be an estimated $840 million. This is based on the average number (4,500) of SY's invested per crop in major crops (cotton, corn, wheat, and soybean) during a period of threefold yield increase, multiplied by the average SY cost of $187,000. New crops such as meadowfoam have been developed for a much smaller investment, and current technology is conducive to accelerated rates of improvement and commercialization. Nevertheless, these major-crop evaluations provide a basis for investment levels needed in, and expectations from, new-crop development. It is important to note, as well, that investments far beyond those from the public sector have contributed to the development of such crops as corn, soybean, wheat, and cotton. Evenson (13) estimated that private funding of U.S. agricultural research in 1979 was 1.5 times more than public funding. Moreover, scientists conduct basic research on major U.S. crop plants funded by sources such as the National Science Foundation, the Department of Energy, and the National Aeronautics and Space Administration, which are not included in the tabulations above. Finally, in the case of most surplus crops, hundreds of additional SY's are invested annually by research and development organizations and universities outside the U.S.

Therefore, 10 to 20 public-funded SYs per year, or approximately $2 to 4 million, focused on a specific, high priority new crop, appear to be a highly conservative minimum investment for a plant that has not yet attracted private research and development interests. Moreover, the support must be dependable and sustainable, allowing scientist commitment to necessary long-term crop improvement projects. Over a 20-year minimum development period, this minimal level of public funding would total $40 to 80 million. By contrast, less than $6 million has been invested during the initial 20-year effort of meadowfoam domestication and commercialization in the state of Oregon.

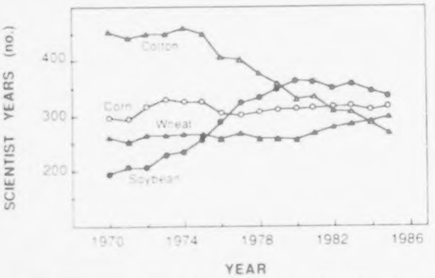

Fig. 4. Total public sector (USDA plus State Agricultural Experiment Station) funding invested in cotton, corn, wheat, and soybean (51).

CHALLENGES FOR LEADERSHIP

The high-risk, long-term nature of new crop development, and the fear of the unknown, seriously hinder policymakers from standing alone in support of such an effort, and preclude private investment. Solutions to the seemingly exotic and complex problems in new crop development may appear costly compared with those related to well established commercial crops; however, opportunities for potentially large advances also are present. Recently, the oil yield of meadowfoam in Oregon was increased 50% over an eight-year period at a cost of less than $1.0 million. In a separate experimental crop, Vernonia, severe seed shattering was overcome by one germplasm acquisition (40). Since the yield potential of new crops generally is undeveloped, dramatic yield increases may be possible within a relatively short time.

The U.S. particularly needs a mechanism to overcome the entry barrier hindering new crop development. In the early stages of crop development, long-term funding is difficult to maintain. Private industry typically is not interested in funding this type of research until the profit potential is apparent. By the same token, unrealistic expectations from new crops is a problem that can result in a defeatist attitude which reduces support for other research projects on new crops. Scientists themselves are often reluctant to risk time on new, uncertain crops which do not carry scientific, financial, and political support. The entry barrier to development is a type of new-crop "catch 22": funding is not provided until profit potential is demonstrated, and this cannot be done without funding the initial research.

Too often new crops are expected to be profitable before necessary developmental research has occurred to increase yield. Thus, economic analysis of yields of wild plants or unadapted alternate crop cultivars have resulted in unimpressive prospects. Even major crops domesticated for millennia have required 20th century-sized research investments for threefold yield increase. Therefore, estimates of future yield and profit potential—and setting of research investment for a given new crop—appropriately could be based on yields at least three times those experienced upon initial domestication or selection. Added indirect benefits from new crops, such as improved pest control through crop rotation, should be measured and credited to the new crop. Furthermore, dramatic reductions in costs of producing, harvesting, processing, and marketing can be expected with systems research and engineering developments. Finally, new crop profit potential should be measured against that from traditional crops minus crop subsidies and other distorting influences.

If past-crop developments provide an index for new-crop yields, they serve as well to emphasize the importance of making long-term commitments. Approximately 200 years elapsed from the time soybean was introduced in North America (22) until it was established as one of the five major field crops. Approximately 80 years were required to move the concept of hybrid corn from hypothesis (1881) to full adoption in the USA (1960) (29).

Most of a century elapsed from the time Daruma-type dwarf wheats were reported in Japan until the dwarfing genes were used extensively in high-yielding U.S. cultivars (41). While biotechnology may offer opportunities for new-crop development at an accelerated pace, traditional plant breeding and agronomic research will be crucial to improvement efforts (6, 8, 16, 28, 38). Thus, based on historical timetables for crop improvements, a philosophy and mechanism allowing a minimum 20-year commitment to improvement of a given new crop is necessary and reasonable.

Unfortunately, in the U.S., nothing less than the national shortage of a commodity and concerted long-term efforts of a champion have been necessary to launch an integrated, national new crop development strategy, as is illustrated by the histories of soybean and rapeseed development (18, 28, 57). This "policy by default," is short-sighted, haphazard, very expensive, and attentive only to commodities necessitated by the historical moment.

Congress should lead the way with legislative policies that would help overcome the multifaceted entry barrier—paving the way for aggressive, sustained, private-sector investment by using, quite literally, the "seed money" of public funding. To justify the use of public funds for improving the profit potential of new crops, a comparison can be made between crop development costs and the costs of surplus commodity programs. We said the cost of improving a new crop, based on precedents, can be estimated at $40 to $840 million. Therefore, the $12 billion cost to the U.S. government for the 1987 corn-related support programs would be equivalent to the estimated total 20-year cost for improvement of 14 to 300 new crops. The $200 billion spent on farm income stabilization during the decade 1978 to 1987 would fund the total 20-year costs of improving 238 to 5,000 new crops. These calcuations dramatize the staggering disproportion in expenditures. And they do not include the economic opportunity losses from not growing profitable new crops on the millions of acres producing surpluses or idled by government payments.

Funding is a necessary condition, but not a guarantee of the successful commercialization of a given new crop or new product. However, experience suggests that potential crops, chosen carefully, could be expected to return wealth to the nation comparable to the $518 billion earned by soybean in 60 years. Less than 1 million acres for each of 50 new crops (symbolically, one per state) could absorb the current domestic excess production capacity. Funding each of 50 new crops at the annual rate of 15 SYs would cost $140 million—approximately 18% of the USDA budget for the Agricultural Research Service (ARS) in 1987, or 7 to 9% of the sum of ARS and individual state appropriations (1987), or 0.31% of the 1987 farm income stabilization costs (Fig. 1).

Contrasting approaches to public funding of crop improvement are revealed by comparing the relative amount invested in soybean development by the U.S. with the resources devoted to rapeseed improvement in Canada. In 1952, the U.S. had the equivalent of 7.3 public geneticist plus plant breeder SYs working on soybean (R. Judd, 1986, personal communication) while the U.S. produced $750 million worth of crop (2, 50), a ratio of 0.0097 geneticists plus plant breeders/1.0 million of crop value. Over the same period, Canada invested in 1.43 geneticist plus plant breeder SYs/1.0 million worth of rapeseed production (47). The Canadian rapeseed development project risked investment at a rate 147 times greater than the U.S. investment in soybean development. The Canadian effort was planned, focused, and coordinated among farmers, industry, government, and academia. Today Canada leads the world in edible rapeseed oil exports.

Agricultural research expenditures in Western Europe were similar to those in North America in 1950, but had become twice as high by 1980 (49). The current extent and aggressiveness of the national new-crops research and development focus in the Netherlands reflect strategic planning plus action. Worldwide expenditures for public agricultural research increased by 360%, after inflation, between 1959 and 1983 (49). During this period, North America's share dropped from 32% of world expenditures to 18% (49). Several competitors in the world agricultural commodities markets have developed highly successful strategies for agricultural technology import and transfer. These strategies have steadily caused U.S. farmers to lose the competitive advantage they had from early adoption of new technology (49).

The U.S. reactive approach to crop research support is illustrated by increased investment only after crop production increased (e.g., soybean, Fig. 5; sunflower, Fig. 6). By contrast, Canadian investment in rapeseed development, as described above, demonstrates a strategy and a relatively higher research investment before crop production was large (Fig. 7). As the records of soybean, rapeseed, and sunflower bear out (16, 28, 31, 47), a relatively high level of initial public investment in research on an appropriate new crop can increase the chances and rate of success and profitability.

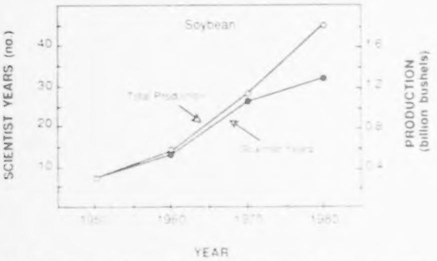

Fig. 5. Soybean production and public sector funding of soybean genetics and plant breeding in the USA (R. Judd, 1986, personal communication, 50).

WHY A NEW ORGANIZATIONAL ENTITY?

Granting that the need exists for new-crop development, and that it will become even more urgent with improved farming efficiency worldwide, the question arises as to how most effectively to implement research and development on new and alternative crops and products. The private sector cannot be expected to undertake the long-term initial investments needed for new-crop development; a steady public support source is fundamental. The well documented (28, 46) unstable nature of public investment in identifying and developing new crops and new products illustrates the critical economic need for strategic planning in U.S. agriculture. It is appropriate to focus national attention on satisfying future consumer and industrial needs from agriculture. Conditions, events, and societies support modifying the "agriculture = food" stereotype to include expanded production of nonfood industrial raw materials.

An ongoing entity—a foundation, institute, center, or association—has been called for (28, 34, 46), and Erich Bloch, director of the National Science Foundation, has described many elements of change needed to foster a national research strategy to rebuild U.S. economic competitiveness (3). The need for new crops could be a rallying point but, as Block points out, making the proposed institutional change will require "tough management, innovative policies, and vigorous leadership" (4).

The importance of a well qualified and unbiased organization involved in objectively choosing and promoting the most promising new crops is evident, based on the structural bias in the political funding process (20). Funding of agricultural research by the public sector overwhelmingly reflects the interests of producers, handlers, and processors of established commodities and technological areas of topical interest (e.g., genetic engineering and biotechnology) (21, 30). The need exists for a forceful and enduring voice for research into new farm and forest commodities (34, 46). While interest is high in such new technologies as genetic-manipulation (30), Vietmeyer (55) cautions against emphasizing technology at the expense of developing renewable sources of wealth, such as a new crop. Likewise, Ruttan (42, p. 348) has pointed out that "institutional innovation is both a more powerful and a more reliable instrument of reform than technical change." The innovation of the Rubber Institute of Malaya in 1925 resulted in a six-fold rubber yield increase from 1920 to 1970 (42, p. 100–107).

An entity responsible for new-crop development would provide the means to develop a strategy, to focus new technology on exploiting renewable wealth from plants, and to solve problems that often prevent their domestication. It could attract scientific talent, steer resources to priority crops, and promote a synergy among diverse interest groups (25). The development of new crops and products could take place largely within existing agricultural research networks. Action of this nature is being taken at the state level through the Greater Minnesota Corporation, and by the University of Minnesota Center for Alternative Crops and Products. A New Farm and Forest Products Working Group has been formed at the University of Missouri, and it cooperates with Missouri Ingenuity, which is a venture-assist corporation.

The track record of crop improvement research by agencies focusing on specific crops has been highly successful to date. The development of the Canadian rapeseed industry was supported by the Saskatchewan Wheat Pool (57). Improved potato germplasm was produced by the International Potato Center and used by over 80 countries (23). These examples attest to the progress possible with long-term support focused on particular crop plants. Other International Agricultural Research Centers (9), and particularly the International Rice Research Institute (24), have made remarkable progress in crop improvement. More than 1,000 new crop cultivars had been developed at these centers by 1983. The modern rice and wheat cultivars developed at these centers annually yield enough more than the old cultivars to feed an additional 500 million people (9). Ironically, while the USA has participated in the planning, development, and support of most of these international centers, it has not established any comparable, comprehensive, interdisciplinary effort for domestic development and commercialization of new crop-plant resources.

PROPOSED FOUNDATION FOR NEW FARM AND FOREST PRODUCTS

Multidisciplinary needs in new crop development argue for creating a stable, organized entity to foster cooperative efforts. Bloch (3) recently cited the need for increased emphasis on centers or institutes to promote interdiscipli-

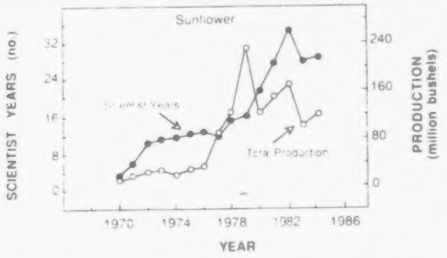

Fig. 6. Sunflower production and public sector funding of sunflower research (50, 51).

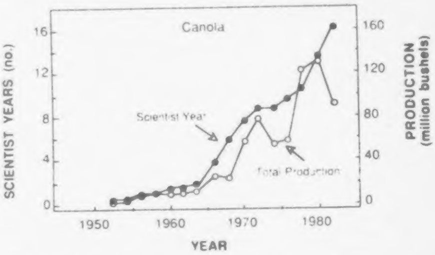

Fig. 7. Canola production and public sector funding of canola genetics and plant breeding in Canada (31).

nary research to address today's complex and challenging problems. The establishment of entities to coordinate research efforts and to focus on vital, multidisciplinary areas has been identified as essential to U.S. economic health. Recent proposals to develop 80 to 100 science and technology centers at U.S. universities by 1992 (36), to create a "National Institute of Technology," and to establish an "Advanced Civilian Technology Agency" (11), reflect the growing awareness of the need for federal action to increase U.S. economic competitiveness.

A New Farm and Forest Products Task Force was formed by the USDA secretary in 1985 (34). The task force was an industry-led, cooperative effort that included government and academic personnel. On 25 June 1987 the task force recommended the formation of a Foundation for New Farm and Forest Products (NFFP). "The proposed organization would be an autonomous, nonprofit, corporate entity with a mission to foster and facilitate the development and commercialization of new farm and forest products. As conceptualized, the Foundation would be specifically charged with the responsibility to achieve the diversification goal. Bridging both private and public sectors, the foundation would serve as an advocate, catalyst, coordinator, and cooperative funding source for the development of new farm and forest products" (34). It also could nurture user, grower, and processor groups for individual crops or products and thus greatly decrease the time required for such necessary groups to organize and operate effectively.

Given the sensitivities involved, extreme care will be required to develop the organizational blueprint to accommodate the diverse nature of potential projects and participants. Trust funds would be used to foster and sustain collaborative initiatives (joint ventures and matching funds) between the private and public sectors. With ebbing federal and state funding of agricultural research (Fig. 1), an adequate source of funds for such an organizational entity is difficult to envision apart from special legislation. It is conceivable that Congress would favor increased total funding of agricultural research and development based on strategic plans for commodity production substantially beyond those traditionally in surplus.

CONCLUSION

Technology exists to exploit the economic potential of new crops as annually renewable alternatives to chronic expenditures on surpluses. The national challenge is to focus sufficient public resources on a prudent number of new crops to make them profitable, without subsidies, for production on U.S. farms. An orderly development of botanical resources is needed to overcome entry barriers and to maximize successes of efforts to develop new farm and forest products. To achieve this goal, an organized national commitment is essential, with responsible institutional structure, resources, accountability, and continuity over several decades.

As Bloch has observed, "New roles for institutions, and more cooperative and innovative relationships among them, will require alteration of some deeply ingrained political attitudes" (4, p. 27).

It is time for Congress to act.

APPRECIATION

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MEADOWFOAM DOMESTICATION IN OREGON: A CHRONOLOGICAL HISTORY[1]

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I. Introduction

Few wild plants have been domesticated and commercialized as a crop by modern society. The recent farm-scale production of meadowfoam in the Willamette Valley of Oregon is an interesting exception.

Technical research often is published in refereed scientific journals. Some 100 or more such references pertain to meadowfoam (_Limnanthes_ R. Br.). Six summary evaluations or reviews related to _Limnanthes_ development as a potential crop have been published (Gentry and Miller, 1965; Higgins et al., 1971; Jolliff et al., 1981; Jolliff, 1981; Jolliff, 1984; and Purdy and Craig, 1987). Also, Jolliff (1989) illustrated that strategic planning and funding are needed for new-crop development in the United States. Meadowfoam development has been hindered severely by the lack of adequate long-term funding needed to support quality professionals in interdisciplinary research, development, and marketing which generate the technologies that lead to economic, environmental, and social profit.

Less frequently is there incentive and an avenue for the documentation and publication of the nontechnical events associated with the development of a new crop. Therefore, the focus of this paper is on the circumstances surrounding the inception and survival of the meadowfoam domestication and development research effort at Oregon State University, and the initiation of commercialization of the crop by the Oregon Meadowfoam Growers Association.

A. evolutionary history

Meadowfoam is the common name given to plants in the genus _Limnanthes_ because the dense floral bloom makes a field appear to be covered with foam. _Limnanthes_ means marshflower. Meadowfoam is native of the west coast of North America and is found in moist areas, such as around vernal pools, and even in shallow water. Mason (1952) concluded that the genus represents a group of eight closely related species of which some are distinguishable only by morphological differences, whereas others have evolved to the point of having developed sterility barriers.

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B. botanical description

The following description by Brown (1883) was taken from Mason (1952): "Annual, decumbent, ascending, or erect herbs with 1 to several branches arising from the base. Leaves pinnately dissected with entire incisely toothed, lobed, or parted segments. Flowers regular, perfect, 4- or 5-merous, usually conspicuous on axillary peduncles. Sepals valvate in the bud. Petals marcescent. Stamens 8-10, those opposite the sepals with a glandlike swelling at the base; anthers introrse in the bud, but becoming extrorse at anthesis. Gynoecium of 4 or 5 separate 1-seeded carpels with the gynobasic styles united at the base or nearly to the tip: stigmas 4 or 5, simple, and minute. Carpels becoming smooth or tuberculate 1-seeded nutlets. Seeds erect, anatropous, lacking endosperm; embryo straight, radicle inferior, cotyledons fleshy, ovate, epigeal."

II. History

A. original cultivation and markets

Meadowfoam (Limnanthes alba Benth.) is a new, winter-annual industrial oilseed crop domesticated at Oregon State University. Development of meadowfoam as a commercial crop began in 1966. Interest in meadowfoam prior to approximately 1966 was related primarily to the topics of plant taxonomy, ornamental horticulture, and embryology. Very little, if any, of that early activity is known to have occurred in Oregon. A series of crises since approximately 1950 have served as stimuli for sporadic attention to meadowfoam as a potential new crop.

Workers in California, located near several native Limnanthes populations studied the embryology (Mason, 1951), systematics (Mason, 1952; Ornduff and Crovollo, 1968; Ornduff, 1969, 1971; Brown et al., 1979), evolutionary ecology (Kalin, 1971; Arroyo, 1973a, 1973b, 1975; Hauptli et al., 1978; Jain, 1978b; Brown and Jain, 1979; Ritland, 1982; McNeill, 1983; McNeill and Jain, 1983; Guerrant, 1984a, 1984b), reproductive systems and related genetics and breeding systems (Jain, 1978; Jain et al., 1978; Jain, 1979a, 1979b; and Abuelgasim, 1983), and other topics related to meadowfoam (Pierce and Jain, 1977; Pollard and Stumpf, 1980). Much of the research on domestication, agronomy, and variety development connected with the initial process of commercialization has been done in Oregon (Calhoun, 1975; Jolliff, et al., 1981; Pearson and Jolliff, 1985, 1986a, and 1986b; Karow et al., 1986).

Professor Wheeler Calhoun, at Oregon State University, focused his initial domestication efforts on a tall upright plant type with good seed retention, to facilitate mechanical harvest. 'Foamore', the first meadowfoam (L. alba var. alba) cultivar traces to a single plant selection made in 1970 from PI 283 704 collected in 1962 by H. S. Gentry 8 miles east of Perkins, California. It was named in 1975 by the Oregon Agricultural Experiment Station. It had a canopy height of 25 to 30 cm, with an upright growth habit, and seed yield of 1,000 to 1,500 kg/ha on research plots.

Improved seed retention, the next priority improvement, was accomplished in the cultivar 'Mermaid' (L. alba var. alba) released in 1984. The cultivar Mermaid originated as a single plant selection made at Corvallis, Oregon in 1972 from PI 283 703. This plant introduction was collected in 1962 by Howard Scott Gentry (USDA) near Antelope, California.

Oil yield per hectare of 50% above Mermaid has been measured on research plots in 1987-88 with populations from interspecific hybridization of L. floccosa x L. alba initiated in 1977 (Jolliff et al., 1984). These advances have come primarily from increased seed size, increased oil content in the seeds, and reduced plant lodging which allows greater seed development and harvest recovery.

Priority interest currently is to accelerate the commercialization of meadowfoam. Increased oil yield (by the Oregon Meadowfoam Growers) should allow the price of the oil to be reduced. The intended result is penetration of higher volume industrial oil markets. Research on higher yielding variety development, improved agronomic production practices, and industrial oil utilization research are in progress. Many areas of needed research are not being addressed because of lack of funding.

III. Models of Development

-- role of surplus commodities

In the late 1950's the United States Department of Agriculture was asked to search for plant sources of useful raw materials for domestic production (Wolff and Jones, 1958). The stimulus for this effort was the excess agricultural production capacity and the costly farm programs associated with surplus commodities. These chronic cycles of surplus production continue. Meadowfoam seed was among about 8,000 plant species screened for their potential as future oilseed crops (Princen, 1983). More than 75 new fatty acids were discovered (Princen, 1983) including three from meadowfoam: cis-5-eicosenoic (20:1); cis-5-docosenoic (22:1); and cis-5, cis-13-docosadienoic (22:2) acids. Additionally, meadowfoam has unique seedoil composition in that 95% of the fatty acids have chain lengths of 20 or more carbons (Miller et al., 1964). Thus the raw oil can be thought of as essentially all long-chain, and marketed as such. Further, it should be noted that approximately 60-65% of the fatty acids are the unique cis-5-eicosenoic.

The unique fatty acids were discovered in the late 1950's through chemical investigations at the U.S.D.A. Northern Regional Research Laboratory at Peoria, Illinois (Earle et al., 1959; Smith et al., 1960; Bagby et al., 1961). This prompted further plant exploration and collection and a season of field observation and note-taking from native stands by U.S.D.A. plant explorer Howard Scott Gentry. In 1962, he collected 28 accessions from California and Oregon (Higgins et al., 1971).

-- role of cooperation/government agencies

A very small cooperative program in the USDA, initiated in approximately 1963, was designed for seed increase and preliminary evaluation (SIPE) of germplasm, including meadowfoam, at a few state agricultural experiment stations. That program was in the Chemurgic Crop Investigations, New Crops Research Branch (NCRB), Crop Research Division (CRD), Agricultural Research Service. The reorganization within ARS in 1972 eliminated any focus on new crops and chemurgic crops and placed the remnant effort under the Plant Genetics and Germplasm Institute in the Germplasm Resources Laboratory.

The meadowfoam accessions collected in 1962 were planted in the fall of 1962 at Chico, California, and Glenn Dale, Maryland. Limnanthes douglasii R. Br. was planted as a spring annual at Palmer, Alaska in 1963. It had indeterminate growth and an estimated seed yield of 2503 kg/ha; the maximum yield at this site in 1967 was 820 kg/ha (Higgins et al., 1971). In 1965 a prospectus on Limnanthes was published (Gentry and Miller, 1965). Limnanthes alba showed the most agronomic potential because of superior seed retention and erect growth habit.

-- role of experiment stations

The commitment at Oregon State University to new crops dates to the early 1900's and Professor George Hyslop. That commitment became more formal in 1960 when Dr. J. R. Cowan, Head, Department of Crop Science, first established the New-Crops Research Project in the Agricultural Experiment Station under the direction of Wheeler Calhoun.

Seven Limnanthes accessions were the first to be grown in the Willamette Valley of Oregon in 1966 at Corvallis to evaluate fall versus spring planting. This effort was part of a larger 16-year involvement by Mr. Calhoun from 1963-1979 in a cooperative agreement with USDA, ARS, CRD, NCRB, Chemurgic Crop Investigations (Dr. George A. White, Program Leader) for seed increase and preliminary evaluation (SIPE) of some 532 accessions of 122 different species in 57 genera. Only the fall-planted meadowfoam was reported as suited to the environmental conditions at Corvallis. Limnanthes alba var. alba yielded the highest at 1350 kg/ha (Jolliff et al., 1981). Based on the literature and early planting trials, Professor Calhoun began to select for upright plant growth habit and improved seed retention as the first two most important traits for domestication.

An agronomic evaluation in 1971 of meadowfoam as a potential new crop (Higgins et al., 1971) was again favorable and supported the 1965 prospectus of Gentry and Miller. The early work on oil composition analysis and the first reported field trials had been done with L. douglasii which had high seed yields but much seed shatter.

-- role of champions

Interest in continued meadowfoam domestication in Oregon was stimulated in Wheeler Calhoun by the need for alternative crops, and by the encouragement from Dr. George White, a USDA scientist, who was convinced of the great agronomic potential of meadowfoam as a new industrial oilseed crop. Funding for new-crops research was very limited. From 1960 through 1967 Professor Calhoun devoted the majority of his time to duties as Superintendent of the Hyslop Crop Science Field Laboratory, to assisting the Head of the Department of Crop Science, to teaching, and he also took a year of sabbatical leave in Ecuador. Funding for a research technician for Mr. Calhoun first was available in 1968. His technician assisted with several of the Departmental Field Laboratory chores as part of the justification of the position.

Meadowfoam investigations first became a major part of the modest New-Crops Research Project at Oregon State University in 1969-70. Experiments included post-emergence selective herbicide screening, nitrogen fertilization effects on seed yield, effects of crop maturity and harvest methods on seed yield of different Limnanthes species, and plant selection for domestication. This effort was expanded in 1970-71 to include evaluation of oil content in L. douglasii; caging of spaced plants for evaluation of self-pollination, seed retention as related to species, fertility rates and application timing, crop maturity, and seed increase.

-- role of entrepreneurs

Soon it became apparent that additional financial resources would be needed to sustain a meadowfoam development effort. Mr. Calhoun then spent two years (1971-1973) on assignment in Iran, during which time Dr. David L. Stamp served as the Leader of the New-Crops Research Project. In the absence of funding support through a national or state strategic plan, it became necessary to 'catch as catch can' from potentially interested funding sources. The first such source was Bohemia, Inc. (Frank Trecino, Chemist) of Eugene, Oregon. This firm was interested in meadowfoam as a source for manufacturing high quality hard wax. Bohemia, Inc. had recently invested in a hexane extraction plant in the Willamette Valley of Oregon to recover wax from fir bark which was a byproduct of its timber and lumber business. Meager funding plus substantial enthusiasm and moral support from this contact was vital to sustaining a lifeline for meadowfoam research in the early 1970's.

-- role of poverty/ the rapeseed tangent

By 1972-73 Professor Calhoun again was on international assignment and the focus of the New-Crops Project was shifting heavily toward the development of high erucic acid rapeseed oil with low glucosinolate levels in the meal. He had initiated this research in 1968 under a cooperative agreement from the USDA Northern Regional Research Laboratory (NRRL), Peoria, Illinois. The USDA, NRRL also cooperated on meadowfoam research by doing substantial chemical analyses. However, to date all funding had been at a low level, on a year-to-year basis, with no financing specifically for meadowfoam improvement and commercialization.

-- role of politics and regulation/ save the whales

Efforts to reduce the harvest of whales brought new attention to meadowfoam during the 1970's as a potential substitute for sperm whale oil. Unfortunately, this flurry of activity brought more 'eureka' stories than it did financial support. The resulting disappointments probably did more to undermine the limited moral support for meadowfoam development than it did to enhance the efforts given to this potential new crop. Records indicate that journalists may have played some role in over-selling meadowfoam during this era.

-- role of a champion/ farm-scale planting

Mr. Calhoun arranged for the first recorded farm-scale planting of meadowfoam. The cultivar Foamore was grown in 1975-76 in the Willamette Valley of Oregon on the farms of P. O'Driscol and J. Smith. Yields on these fields were very low and seed losses were very high. Foamore was grown by five different farmers in 1976-77 on a total of 11.4 hectares with the highest seed yield reported as 722 kg/ha, and no record of the amount of seed shatter loss.

-- role of politics and poverty/ the poppy tangent

In 1977 attention and contract funding turned to agronomic studies of the perennial 'scarlet' poppy Papaver bracteatum Lindl. as an alternate source of codeine. Meadowfoam research again took the 'backseat' by funding default.

-- the role of crisis/ government agencies and regulation

Open-field burning of grass seed crop residues in the Willamette Valley of Oregon was the next controversy to promote discussions concerning meadowfoam. This practice, initiated in the 1940's, had been the source of substantial public controversy. Research had shown that meadowfoam had substantial tolerance to the very poorly drained soils on which annual ryegrass would yield well, but on which economic production of other crops was not feasible. Legislation was passed in Oregon in 1977 which mandated that a portion of field-burning acreage assessment fees be used for research on cropping alternatives. However, it took three additional years before funds from this source began to be used to support meadowfoam research in the New-Crops Research Project at Oregon State University.

-- role of government agencies/ federal-state cooperation.

In the meantime, a small amount of competitive grant research funding for meadowfoam was initiated through the Pacific Northwest Regional Commission in 1978. This joint federal and state funding source was designed for regional economic development projects. Meadowfoam had enough support in the Oregon Department of Agriculture to gain approval of the tri-state (ID, OR, WA) governors. This annual funding source for research on pollination biology, seed oil extraction, oil utilization exploration, potential insect pests, meal utilization as feed, and interspecific hybridization to reduce protandry (and reduce dependence on insect pollinators) was sustained for 3 years. Small amounts of progress were made in each area.

-- changing the guard

The permanent leadership of the New-Crops Research Project was assigned to Gary D. Jolliff in 1978 when Wheeler Calhoun accepted an assignment with the USDA in Thailand, and subsequently retired.

-- politics and funding/ lose some, win some

By 1979 all USDA cooperative research support funds had terminated. Even though none of them had been specifically for meadowfoam, it still threatened the productivity of the program. Fortunately, the Oregon Department of Environmental Quality, Field Burning Research Advisory Committee (DEQ), funded the commercial production of a 15.9 ha field of an improved meadowfoam selection for seed increase and oil production to use in samples for industrial utilization research. Very little detailed information had been developed on meadowfoam production practices. The seed yield was not very high, but the experiences of large-scale production generated affirmation that the plant was very well suited for agronomic production using the same equipment common to grass seed growers. The obvious need was to increase yields of oil per hectare. The obvious challenge was to find a mechanism to generate funding for developing high yielding varieties plus appropriate production practices. Clearly, nobody was interested in taking risks of funding the research at high enough levels and for a long enough period to achieve the desired rate of yield increase.

-- role of federal-state cooperation

A tri-state (Idaho, Oregon, Washington) alternate oilseed research project also was initiated in 1979 by Dr. D. L. Auld at the University of Idaho. Several oilseed crops were researched in the Pacific Northwest. This was an annual funding source for two years, and it gave another glimmer of hope for meadowfoam in Oregon. This allowed for the initiation of research on nitrogen fertilization and water stress as factors limiting meadowfoam seed yield (Pearson and Jolliff, 1985, 1986a, and 1988b). It was apparent that the key to meadowfoam commercialization was the development of profit potential for growers, plus profit potential for oil buyers. This would require oil yields high enough to support a relatively low market price for the oil. The exact price needed to accomplish this commercialization was an unknown.

-- role of crises/ field burning/ oil embargo

In the meantime, the Oregon DEQ funded its first research project on meadowfoam in 1980 to increase seed yield. Also, the effects of the oil embargo of the 1970's had rippled through the federal agency system and competitive research funds were made available through the Department of Energy and the USDA. A competitive research grant for meadowfoam research was won in 1981. It is the only occasion in the 22-year history of meadowfoam research at Oregon State University that meadowfoam-specific funding has ever been available with certainty on more than an annually funded basis.

-- role of crises/ entrepreneurs/ competition (3 situations)

Interest of Standard Oil of Ohio in meadowfoam oil resulted in a small, one-year research contract funded in 1982 to study how to grow meadowfoam under controlled environments. In the same year, the first major proposal for research, $86,383, plus equipment and seed production was funded by the Oregon DEQ. A probable stimulus for the DEQ support was the interest by a Japanese chemical company (NIKKO) in purchasing meadowfoam oil for use in cosmetics. Apparently, supply shortages and high prices of jojoba oil in the international marketplace during the early 1980's prompted this interest from Japan.

-- role of scientific research

These expressions of interest in meadowfoam oil as a raw material probably generated what the author considered to be an important turning point in the history of meadowfoam development. The progress was in perceptions and subsequent research funding. The funding supported breeding and agronomic research which allowed additional glimmers of hope to be generated in the late 1980's by a 50% increase in oil yield per hectare.

-- role of a champion, experiment station, government agency, and entrepreneurs

Consequently, it was considered timely to involve the private sector directly in meadowfoam development and commercialization. The most advanced genetic line of meadowfoam from the New-Crops Research Project, Department of Crop Science, Oregon State University was named 'Mermaid' by the Oregon Agricultural Experiment Station (OAES). The OAES held public hearings in April 1984 concerning the potential exclusive release of the cultivar Mermaid. Subsequently, the exclusive release was made on the basis of written proposals which showed the best combination of commitment to, and capability of promoting meadowfoam development as a new industrial oilseed crop for Oregon. A result of the process was the formation of the Oregon Meadowfoam Growers Association (OMGA). The cultivar Mermaid, which is Plant Variety Protected, was released by OAES exclusively to the OMGA. The OMGA has played vital roles in the economics and politics of funding research, production, and market development. The OMGA started with about 15 growers and soon expanded to 20 members.

In 1985 the OMGA hired a part-time program coordinator who began assuming responsibility for initiating and responding to industry contacts related to meadowfoam oil utilization. Previously, this work had been done by the New-Crops Research Project at Oregon State University and a chemist at Bohemia, Inc.

The mean seed yields of Foamore and Mermaid in replicated yield trials at Corvallis, Oregon for the period 1975-1988 were 1034 and 1253 kg/ha, respectively. Oregon Meadowfoam Growers Association members have produced approximately 49, 314, and 61 hectares of meadowfoam in 1984, 1985, and 1986, respectively. In 1987 they produced 298 hectares to build ample seed and oil inventories to meet what was perceived as an important responsiveness capability to larger orders for oil or planted area. There was no production in 1987-88 or in 1988-89 because of lack of market demand beyond the inventory buildup of 1986-87. Farm yields have averaged approximately 220 kg/ha oil. The price per pound of refined oil was lowered in 1988 from $3.65 to $2.85. The Oregon Meadowfoam Growers Association risk capital investment has been extremely high compared to the profit made to date. Therefore, it is obvious that this type of venture warrants a greater opportunity for risk-taking partnership with a public entity. The rationale for establishing such an entity has been published (Jolliff, 1989).

Thus, the high priority is to get higher oil yields so that farmer profit can be maintained as the oil price is lowered further to generate more market demand in the higher volume, lower value industrial application.

By 1984 virtually no public funds, federal or state, had been appropriated for meadowfoam-specific research. Not even one scientist, anywhere in the world, had been known to have worked full-time, in a permanent position, on meadowfoam. That still may be true. A strong justification for investing, in meadowfoam development, 20 scientist years per year of well-supported permanent scientists on a long term (20 year) basis has been published (Jolliff, 1989).

-- role of politics and funding

Among other things, the OMGA encouraged federal funding of meadowfoam oil utilization research at the USDA, NRRL, Peoria, IL where the original oil chemistry work had been done. The first known federal meadowfoam-specific funding was in the 1987 fiscal year for oil utilization work by the USDA. Two post-doctorate chemists were hired by the USDA, NRRL, Peoria, IL during the summer of 1988 to begin meadowfoam oil utilization research. This is approximately 30 years after the discovery of the unique fatty acids in meadowfoam oil.

Additionally, the OMGA was instrumental in forwarding a research funding proposal in 1987 for the accelerated commercial development of meadowfoam. No state legislative funding was garnered, but a small federal budget was appropriated to form an embryonic partnership with the public and private funding that existed in the State of Oregon. The first data will be gathered from this cooperative research in 1989.

Recent progress in increased oil yield per hectare has been encouraging when one considers the level and types of research support available. Disappointments with progress in new-crops research seem to be related to a lack of understanding of the magnitude of investment needed, and the time required. Thus, a common consequence is the retrospect that a crop may have been over-promoted. That might be true, but it may also simply have been under-funded. The technology leading to profitable enterprises typically is the result of research and development investments by someone.

-- hindsight design model

Given the political environment of the past 35 years and the federal organizational structure within USDA, one might expect the type of scenario as described above. Politically and economically there is little evidence to suggest that more motivation for risk-taking could be expected. However, incentives could change through institutional innovations as proposed in the U.S. Congress by legislation such as S 690 in 1959 (McMillen, 1959) or H.R. 5056 in 1988. In both cases Congress was attempting to create a specific institutional structure with responsibility for research on new crops and industrial uses of existing crops.

IV. Future Development

One could ask if there is reason to suspect that meadowfoam might be the ‘industrial soybean’ of the year 2100. Should this happen, it seems likely that the forces of crop champions, crises, and risk-benefit ratios which drove the decision-making processes of the past will continue to play a role in the future.

Profit is the name of the game. It is important for farmers, but it may be even more important for large industrial oil users who must make major shifts in manufacturing formulations, processes, or products. It takes time to develop necessary understanding and margins of safety even after the minimal profit margin is achievable.

Evidence has been presented to support the notion that the U.S. Congress should change the rules of the game we play with new-crop development (Jolliff, 1989). Ruttan and Hayami (1984) define this as the process of institutional innovation. A forceful voice is needed to represent new crops before Congress. For example, new crops should be expected to compete with established crops minus subsidies. This applies to both production and marketing. Levels and duration of funding for research and development should be made on par with the expected rate of increased crop productivity.

It is in the public interest to have more risk-sharing by the federal government, with state governments and with the private sector for new-crop development. The stability of at least a "3-legged stool" is critical.

To date, no major biological barriers to high oil yield per acre have been encountered with meadowfoam. Many opportunities exist for increasing oil yield per hectare and for reducing costs of production.

-Late notes

ON JANUARY 26, 1989 THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) SUSPENDED ALL RESEARCH FUNDING FOR 1989-90. THIS LIKELY WILL HAVE LONG-TERM EFFECTS ON MEADOWFOAM DEVELOPMENT.

On February 27, 1989 the Oregon DEQ further reduced meadowfoam research funding by cutting the budget of work in progress at Oregon State University.

These actions resulted from a decrease in funds available to the Oregon Department of Environmental Quality from grass seed field burning fees. The loss of fees resulted from a moratorium on open-field burning of grass seed field residues in Oregon in 1988 after a field-smoke related crash of several vehicles on Interstate 5 near Albany, Oregon in which seven people died and several more were injured.

Focus in the 1988-89 Oregon Legislative session related to this matter was on the two sides which argued about banning field burning. The legislative session ended in June 1989 without new legislation on field burning. Neither was there legislation to provide an alternative funding mechanism for continuing the meadowfoam research and development support suspended by the Oregon Department of Environmental Quality.

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Senator DASCHLE. Thank you, Dr. Jolliff.
Mr. Sneller.

STATEMENT OF TODD C. SNELLER, ADMINISTRATOR, NEBRASKA GASOHOL COMMITTEE, LINCOLN, NE

Mr. SNELLER. Thank you, Senator.

FOCUS COMMENTS ON AN ALTERNATIVE USE FOR CROPS—SPECIFICALLY ETHANOL

I would like to focus my comments on the one area of this topic that I am familiar with, which is an alternative use for crops, specifically ethanol.

You are generally familiar with Nebraska's ethanol program, that was established by the legislature in 1971. I am the administrator of that program, and have been for about 13 years.

IN 1986, THE NEBRASKA LEGISLATURE ESTABLISHED THE NEBRASKA ETHANOL AUTHORITY AND DEVELOPMENT BOARD

In 1986, then Governor Bob Kerrey, now a member of your subcommittee as a U.S. Senator, enacted legislation and signed that into law, created an investment fund to help further those efforts. A portion of those investment funds can be used for research of secondary educational institutions.

I have been put in the role, by choice, of being the administrator of a fund that can provide some research resources. And I have also been directed by that same legislation to seek out resources to further our objectives with the use of research funds that might be available on the Federal level.

So I have seen both sides of this, being in the role of a solicitor of funds, and also being in the role of an evaluator of proposals for funding.

A FEW OBSERVATIONS ABOUT THE PROCESS BASED ON MY EXPERIENCE AS BEING BOTH A SOLICITOR OF FUNDS

I hope I do not appear cynical today, but what I would like to do is make a few observations about the process based on my experience as being both a solicitor of funds, as well as an evaluator of some of the proposals that have been submitted before the two boards I represent.

One of the things over the past 13 years I have noticed is that while there have been changes, many of these have not been necessarily improvements. And I guess therein lies some of the observations I will make today. Specifically an awareness of funding resources.

AWARENESS OF FUNDING RESOURCES

This is a great source of frustration to one who is not a researcher, who is not a scientist, who is not tied in specifically and directly with land-grant universities or other educational institutions.

I represent a State agency and, like many other State agencies that are interested in moving forward with different commodity related initiatives, we, from time to time, feel that there is an information gap, and there are several recent examples of this. I think that the lack of awareness of available research funds and available programs causes a couple of problems, one of redundancy in research and one in simply a lack of awareness about the resources that may be available to different programs that have a need to move with agricultural initiatives.

And my experience is probably representative of my counterparts throughout the Midwest. In conversations with them, I noticed the same problems with redundancy in some research. Some of that is by design and some of that is necessary to replicate research results. On the other hands, some of that is simply sheer redundancy and is a waste of valuable resources that I think everybody has acknowledged are in short supply today in terms of funding for necessary programs.

LET ME TRY TO POINT OUT A PROBLEM ONE SHOULD OFFER SOLUTIONS

Let me try to point out a problem one should offer solutions, so I would like to at least offer a couple for your consideration.

One of the recent examples I wanted to cite was a grant that I read about in the alcohol fuel trade publications that was awarded to a group called the American Coalition for Ethanol. South Dakota is one of the three members of that organization. And they were recently awarded the USDA grant of $34,400 for public information program on ethanol, specifically in the area my responsibilities. And so I had some interest in trying to tap a similar fund.

A call yesterday to the Director of the Energy Office, within USDA, indicated that he too within the Agency had attempted to try and find out the source of those funds. And as of late yesterday afternoon, had not been successful in doing that.

If the Administrator of a program within USDA is not aware of the source of those funds within the Agency, that, I think, is illustrative of the kind of frustration a person like myself might face in trying to determine the source of those funds. I do not want to be critical or cynical, but this is a practical problem that someone in my position faces, and is similar to those of my counterparts throughout the Midwest who have similar responsibilities.

I guess there are a couple of things that could be done to help this. In fact, some of these may be being done and I am simply not aware of them. But my counterparts throughout the Midwest are also not aware of them.

SOMETHING THAT WOULD HELP

Something along the line of a monthly or quarterly bulletin to a centralized State agency, such as a Governor's office or an agriculture department, could put that responsibility back on the State level. That State, on the State level then, those people would know who had program responsibilities, and who would be most likely to be responsive, and we need that information.

The second thing might be a publicized toll-free phone number, or a computer link-up to find out what programs are currently available, what is the fiscal year expiration date, what is the area of applicability. Not all of us have programs where we have the staff daily read the Federal Register and find out wherever that information is posted and, consequently, it might be easier to make some sort of a quick overview mechanism available to State programs.

Another possibility might be the designation of a specific location to function as an information clearinghouse. In the past, for instance, I had been able to contact the Solar Energy Research Institute or the National Center for Appropriate Technology, and try and find out what sorts of programs in a specific area of ethanol research were being conducted. And typically a national clearinghouse like that could quickly provide that information.

I notice that Representative Bob Wise of West Virginia has proposed a National Center for Alternative Transportation Fuels, I do not know if that is a redundant proposal, given the fact that there are other organizations, like SERI and NCAT, but it is the type of concept where there will be a centralized clearinghouse for information specifically relating to this topic area.

FEDERAL AGENCY COORDINATION IS IMPORTANT

And then I think Federal agency coordination is important. I did not mean to pick on USDA. I had the same experience with the Department of Energy last week, and have been running around now for about 2½ weeks simply trying to get some information on unsolicited grant proposals. I have been assured verbally. I have followed that up with requests in writing. And this came on the heels of my personal briefing of the President and Admiral Watkins on June 13 in Lincoln. And still the fact that I had a personal request from Admiral Watkins inquiring about an area related to ethanol research, I still could not get the information from program managers within DOE.

So, from my standpoint, that is a frustrating exercise to go through and I think points out the need for either better coordination or better responsiveness on the part of agencies that have access to the resources that we should be able to tap into from time to time.

I think creating this awareness helps reduce the redundancy problem in research. And I will point the finger at myself on this occasion.

The State of Nebraska has numerous examples, and I have noticed these in other States where we are oftentimes interested in following up on a research proposal that looks interesting. A recent example would be the area of using ethanol and diesel equipment. That has been done from time to time in the past, and with the idea of reducing particulates in many of the urban areas that come from buses.

The first application of that, tractors, is now extended to intercity buses. And so there is a great deal of interest in trying to find out what sort of research has been done, what sort of programs might be conducted.

The Nebraska Wheat Board is a recent example. They allocated $10,000 for this sort of a program. In the same week that they passed that allocation, the University of Nebraska Engine Testing Center submitted a proposal. They were not aware of the allocation. They were not aware of the project that had been done by National Corn Growers in conjunction with the private sector. So, again, I think that we can eliminate some redundancy.

So I think the awareness factor, the coordination factor are important points. You had asked a question of the previous panel about whether the tail was wagging the dog in terms of research and program support. In fact, I do not think that is necessarily a bad symptom.

In fact, one of the guiding principles, when I evaluate research projects, is to take a look at what participation there might be from the private sector in coordinating and cooperating with us in research.

A recent example of that was some research that needed to be done on ethyl tertiary butylether. The EPA felt there was a need to do some emission testing. Our program felt there was a need to provide some documentation in that area. And, on a cooperative basis, the EPA, the Nebraska Gasohol Committee, farmland industries, and Gulf Oil provided the financial resources necessary to support that research. That to me is a test of whether there is a need for the research, No. 1, and No. 2, whether there is some commercial applicability for the results of that. And I think that, as a guiding principle, sometimes can be very helpful in evaluating the worthiness of projects.

SOLE SOURCE PROGRAM FUNDING

A final point I would make is that the State of Nebraska, like many other Midwestern programs, have provided much of the initiative that goes behind some of the ethanol related research and most of the funding.

I looked at the last 7 fiscal years in Nebraska, and just from the corn sorghum and wheat commodity programs there, in addition to the Gasohol Committee, we have dedicated $2,144,000 to ethanol research. In the context of all research dollars, that is not a lot of money. In the context of what a very small State in terms of population has been able to commit to this one area of research, that is a formidable amount of money.

In that same time period, the Federal commitment was $30,000. That was committed only on the basis of the Gasohol Committee being able to match that on a dollar-for-dollar basis.

Farmers typically are willing to apply their resources, their checkoff dollars to an area of need, and I think they focus those on areas of real need. On the other hand, that hardly seems an equitable distribution of some research that probably has some mutual benefits.

[The prepared statement of Mr. Sneller follows:]

TESTIMONY
SENATE AG COMMITTEE'S AG RESEARCH AND GENERAL LEGISLATION SUBCOMMITTEE

July 27, 1989
10:00 a.m.
Russell Senate Agriculture Committee
Hearing Room, SR-332

Presented by
Todd C. Sneller, Administrator
Nebraska Gasohol Committee

Background:

In 1971, the Nebraska Legislature enacted legislation which established a grain alcohol program in Nebraska. The Nebraska Gasohol Committee was designated as the agency to carry out the legislatively established program. In 1986, the Nebraska Legislature established the Nebraska Ethanol Authority & Development Board. This entity has a $17 million investment fund, a portion of which may be used to support research. Statutory language directs both programs to initiate and support research which will further efforts to establish a grain alcohol industry in Nebraska. The Nebraska Ethanol Authority & Development Board is specifically directed to pursue available federal funds or surplus commodities which can be used as resources to implement board objectives. Both boards are agencies of State government. Neither board receives general tax fund support. Funding for both boards has come almost entirely from assessments on grain, commonly called a "check-off", and from withholding a portion of tax refunds related to off-highway gasoline use.

In my capacity as administrator of the Nebraska Gasohol Committee, and as technical adviser to the Nebraska Ethanol Authority & Development Board, I face the challenge of securing financial support necessary to advancement of research and market development initiatives. My experience is primarily with ethanol related programs at the state level. However, many of the programs involving fuel ethanol research and development are presently initiated and financed at the state level. As a result, my experience in attempting to secure financial support for research and market development programs is representative of efforts by my counterparts in other states.

These comments are intended to create a greater awareness of the problems associated with implementing research and market development at the state level. My experience with the Nebraska ethanol programs spans thirteen years. While there have been changes in program funding opportunities during the past thirteen years, the changes do not necessarily represent improvements. I hope the information provided by panelists here today can be useful in affecting changes which represent improvements in program funding options. Following are comments which reflect my views about the practical problems associated with research program funding.

Awareness of Funding Resources:

A common practical problem at the state level appears to be a lack of awareness of available federal research funds. While land grant universities may have better lines of communication with the USDA, many state level programs, public and private, seem to face an information gap. Monthly or quarterly bulletins advising a centralized state agency, such as an agriculture department or governor's office, would be a useful change. Such notification also places program awareness responsibilities at the state level where appropriate public and private entities can be notified.

A publicized toll-free telephone number or computer link-up which provides information on research programs is another alternative.

An additional option may be the designation of a specific location to function as an information clearinghouse. In past years, those people interested in alternative fuels work could contact the Solar Energy Research Institute or the National Center for Appropriate Technology. U.S. Representative Bob Wise of West Virginia recently proposed expending $3.5 million to establish a National Center for Alternative Transportation Fuels. The same concept of a central information repository exists with Representative Wise's proposal as with the SERI and NCAT examples. The challenge is to create an awareness of these entities and the informational services they provide. Establishing such a service will help reduce the potential for a second problem related to research programs -- the potential for duplication.

Research Program Duplication:

The lack of a central information repository and program notification system clearly increases the potential for research duplication. Research resources are scarce which makes duplication a costly waste. Research reproducibility is occasionally desirable and even necessary. Redundancy is not. Even within a state there are examples of research duplication. While some occurrences of duplication may be intentional, I firmly believe others result from an information void. Examples of research duplication are more numerous when one examines programs conducted in other states. Again, some of this may be due to provincialism but awareness of redundant research may help evaluators of research proposals reduce duplicative projects.

Sole Source Program Funding:

A recent examination of Nebraska ethanol research and market development program funding revealed a surprising picture. Virtually all ethanol related programs, as well as alternative crop programs, are funded by "check-off" dollars. During the last seven fiscal years, nearly $2,144,000 has been spent on ethanol related research and market development programs in Nebraska. That entire amount came from corn, wheat and sorghum check-off funds. I am aware of only one instance in the last decade where federal funds were acquired for use in an ethanol related research activity in Nebraska. The federal commitment was $30,000 and the commitment required a $30,000 matching contribution from the Nebraska Gasohol Committee. While most farmers are willing to carry a fair share of the responsibility for funding agriculturally related research, the Nebraska example is hardly equitable. However, without the commitment of grain check-off funds, necessary research would not be conducted in many cases.

In several midwestern states, oil overcharge settlement funds are providing modest support for ethanol related research. However, those funds are available only in small amounts and often carry with them conditions which are difficult to meet such as a private sector match.

One concept for consideration by the committee might be the use of commodity check-off funds to attract federal research funds. That would provide a more equitable cost sharing for projects with mutual benefits. Such a program could be designed to respond to unsolicited as well as targeted research projects. Project proposals may be required to provide a dollar match based on a pre-determined formula, i.e., dollar for dollar or two for one match. A statement about commercial applicability of the proposed project as well as a statement of need could also be included in the program criteria.

The Commercialization Challenge:

A guiding principle of research funded by the Nebraska Gasohol Committee is to evaluate commercial application of a process or product. This principle helps eliminate programs which may represent "research for the sake of research." On-going research which provides graduate assistanceships but has little potential for commercialization is a reoccurring problem which could be minimized by a commercial applicability standard. A commercial applicability principle can help identify projects which are most likely to attract financial support from the private sector. A similar standard may be useful in a federally funded program. Projects evolving successfully from agricultural business "incubators" may have a higher commercial success ratio if the initial research "seed" money is tied to this principle. Research may also be more responsive to marketplace requirements.

Summary:

Improvements in the dissemination of research program information may well be a key to addressing several practical problems with agricultural research programs. The reduction of duplicitous research and better coordination of related research programs should result in a more productive use of scarce research funds. The attraction of federal funds with a matching state commitment may extend the existing research effort. The goal of commercial applicability may be a useful guiding principle in determining the allocation of research funds.

Senator **Daschle**. Thank you Mr. Sneller.

I would only comment, in response to your point about there may be nothing wrong with going after those private moneys which are available, in an aggressive way.

To a certain extent, I feel that public money chasing the private money is perfectly acceptable if it fits within the parameters of the priorities that we set out in research. I mean that is the question.

If we take that public money and go after private money just because it is there, and it falls outside the real set of priorities that we have established, then it is a question that I think is worth considering as a matter of public policy.

It sounds to me like we have another typical nondepartmental problem in the sense that we are talking specifically about this department, but another bureaucratic handicap, if you will, with regard to proper information dissemination and adequate understanding of where funding resources may lie.

Are you familiar with the particular case that he has mentioned, Dr. Jordan?

Dr. **Jordan**. Yes, sir, I am the Administrator. You have come to the source. [Laughter.]

We have, of course, as you pointed out, published in the Federal Register. That may not have reached you in appropriate time. We do have an Office for Small Business Innovation Research that could have been of help to you.

On top of that, there is a National Agriculture Library program that sends out information alerts, and they do have a data base. And so I suppose one of the linkages, I will accept it on the Department side for part of it if you will accept it for the State of Nebraska, because you have within the State agricultural experiment station there, a resource that you could have gone to that would have given you the answers like that, I think.

So maybe we could trade off and say we both need to do a better job of communicating across the Nation.

Senator **Daschle**. Any response? Mr. Sneller.

Mr. **Sneller**. No. I think, as I pointed out earlier, one of the caveats to my criticism was that it may well be simply because I am not aware of that again.

That I look at as part of the university system, and that is a second layer of the university system getting to the extension.

Within State government, certainly I had attempted to get that information from the State department of agriculture and they were not immediately aware of it.

Dr. **Jordan**. And we probably are a little guilty in that regard. We need to communicate more directly with the directors and commissioners and secretaries of Agriculture.

Senator **Daschle**. Dr. Jolliff, you said there really is not a spokesman, there is not anyone out there who is advocating the need to focus to a greater extent on alternative market and product development, alternative crop development.

Dr. Jordan just indicated that we are spending $100 million on research for alternative product market development today. Is that not enough?

Dr. **Jolliff**. Well, I think the key thing, Mr. Chairman, is that the majority of those funds currently and historically have been spent looking for new products for existing surplus commodities. Much of that has been submitted for the historical record in printed documents. A lot of it came out of the Chemurgic Digest of the 1950's.

I think if we want to look for the type of voice that this Nation needs to get an appropriate amount of resources invested for the long haul, to develop new crops as annually renewable sources of wealth where they can have this excess land producing something of value for the Nation, then we need a spokesperson like Wheeler McMillon who, for 50 years, tried to develop a voice for increased industrial use of agricultural products. That was initiated with the help of Henry Ford and Thomas Edison back in the 1930's.

But the point is that the enthusiasm and the commitment that Wheeler McMillon provided was not institutionalized by Congress to develop new crops. So when he passed out of the picture, most of it faded away.

Senator DASCHLE. When was that?

Dr. JOLLIFF. Well, I think he retired informally as the editor of Chemurgic Digest somewhere in the early 1960's. He, by the way, did attend the Secretary of Agriculture's Challenge Forum in 1984, when then Secretary John Block had called together a Challenge Forum to try to figure out what to do with surpluses again.

As I prepared for this hearing, I tried to determine how frequently we revisit the crisis of surpluses. It is not that predictable. It is as frequent as 7 years, and maybe 20 or 30 years between some cycles.

But the bottom line is that new crops, by definition, simply do not have a voice in the political arena that these gentlemen in USDA have to face every day.

I was raised in Ohio, and I just visited a family that is trying to make a living on the farm. I do not have a thing against corn and soybeans. I worked with them as a kid. I saw soybeans come in as a new crop, and as you know, it has been a lifesaver economically. But we do not have anyone to speak up for other new crops that could also be valuable. And we do not have people—again with all due respect for these gentlemen (Drs. Jordan, O'Connell, and Tallent), they have not been in the field as plant breeders trying to make these crops profitable. And if new crops are not profitable, you are not going to get industry to come alongside and venture with it. It is just that simple.

I have had 10 years following up on a crop that USDA discovered. The reason they discovered it was because Congress said, in the fifties, we are spending too much money on surpluses. Peoria, here is some money. Go out and find something that is not in surplus that we can grow. And meadowfoam happened to be one of the things they found.

But, importantly, there was not the institutional mechanism within the legislation that allowed USDA to make that crop profitable. They did not provide for the plant breeding, the genetics, the agronomy, the marketing in that legislation.

USDA has done a marvelous job in those areas where they have been given the mandate and they can be about their business. But when it comes down to making these hard decisions on resource allocations, new crops do not receive adequate support.

There are political chips that you have to play. You cannot predict the future. When surpluses go high, we can get the attention; when surpluses go down, then there are those alarmists who will tell you we are going to run out of food. And who are the corn growers to say we ought not to grow more corn?

If somebody pulls out the plug on acreage restrictions, plant it. We know how to do it. I would do the same if I were there. But new crops are too risky and too long term.

I think we had a very, very optimistic projection—in the earlier testimony from Dr. Jordan—that 3 to 5 years are needed to put these things in place if everything is great. I would say that would be closer to 10 to 20 years. Because we are talking about kenaf that I think USDA became involved in that, maybe as long as 30 or 40 years ago. And that is not truly a new crop on a world prospective. It has been grown elsewhere for a long time. And the same thing is true with some of these other crops.

We could talk about crambe or rapeseed. Rapeseed, for example, is one of the most researched plants in the world next to corn. It has been the lifeblood of Europe. And it is politics that has kept the United States from getting into rapeseed earlier.

My predecessor worked on rapeseed at the encouragement of the USDA chemists in Peoria, Illinois. They could see a potential, and they said we have been importing this material. We ought to develop it here.

I bet you can guess what happened when we tried to go to USDA and get funding for a new oilseed crop that would compete perhaps with the soybean. You can expect it, you know. And that is not to criticize individuals who are looking out for their behalf. But there is no one to speak up regularly for new crops.

And so a voice is needed, whether it is convincing Congress, bringing you folks the right information at the right time, giving USDA the right information, or watchdogging that funds are spent as intended. A former Chief of the Industrial Crops Laboratory of the USDA Northern Utilization Research and Development Division of the Agricultural Research Service at Peoria, Illinois, Dr. Ivan Wolff, was a fellow member on a national task force that I served on. And he, in that process of examining new crops, shared his personal frustration of getting pressure from outside commodity groups to shift that money away from new crops and into surplus commodities.

Senator Daschle. Is that true, Dr. Jordan?

Dr. Jordan. There is an element of truth to that I think. You know, when things are good, nobody is hunting for those alternatives nearly as intensive.

I think we as the Government have an obligation to carry that forward, even though times are good.

Gasohol is a good example. We should continue to work on that problem, simply because we have cheaper fuel now? No. I think we need to get it ready for a tougher day, don't we?

Senator Daschle. Let me ask about that $110 million you were telling me about.

Using Dr. Jolliff's criteria for determining the availability of that money for new crop rather than strains of current crops, how do we look then? What is the amount that we actually allocate in research this year for new crops?

Dr. JORDAN. That data that I have before me, Mr. Chairman, is not broken out between new and improved products unfortunately. But the subdivisions that I add up to $110 million come from new and improved forest products, new and improved fruit and vegetable products and byproducts, new and improved food products from field crops, new and improved feed textile and industrial products from field crops, and new and improved meat, milk, eggs, and other animal food products, and new and improved nonfood animal products.

So there is a mix there. And to an extent I think the emphasis has been moving on excess products that we are already producing whereas, as a result of the 1984 Challenge Forum that Secretary Block authorized and conducted, we are now turning our attention much more heavily. And we do need additional funding, there is no doubt about that. And we need to redirect some that we already have, and that is being accomplished.

There is, in Dr. O'Connell's unit, in growing industrial materials, a program plan on 14 different ones. We are chipping away at that list as resources and time allow. And then the Agricultural Research Service, I think Dr. Tallent would be more able to tell you what they are specifically working on today.

Are the problems all solved? No, sir. Do we have all the resources that we need? No, sir. On the other hand, we are working on it on a continuing basis. And I think the dialog today has been helpful.

Senator DASCHLE. Dr. Jordan, could you provide for the record some kind of delineation between new and improved in the allocation funds in each of the categories that you have indicated?

Dr. JORDAN. I will go back to the current research information system and see what kind of detail we can bring to you. And we will bring every bit of the detail that we can.

Senator DASCHLE. That would be helpful.

[The information of Dr. Jordan follows:]

Funding for research to expand the demand for farm and forest products by developing new and improved products and processes (Research Problem Area 4) totaled $114.14 million in fiscal year 1988 with USDA providing $63.22 million of the total (Table 1). For field crops, $16.31 million is provided by USDA for new and improved feed, textile, and industrial products. This category includes $0.56 million for minor oilseeds and miscellaneous crops, $7.77 million for cotton/cottonseed, $2.47 million for soybeans, and $2.13 million for corn (Table 2). Within field crops, categories for minor oilseeds and for miscellaneous and new crops are those under which postharvest research and development for commercialization occurs for agricultural industrial materials.

For FY 1988, funding across all Research Problem Areas from USDA, other Federal, and non-Federal sources totaled $8.30 million for minor oilseeds and $14.44 million for miscellaneous and new crops. Thus, only $6.9 percent of the funds available for these two categories are allocated to expanding demand.

[Tables 1 and 2 follow:]

TABLE 1.—FUNDING TO EXPAND THE DEMAND FOR FARM AND FOREST PRODUCTS BY DEVELOPING NEW AND IMPROVED PRODUCTS AND PROCESS—BY ORGANIZATION AND RESEARCH PROBLEM AREA (RPA)—1988 CRIS SUMMARY

[Dollars in millions]

Title	RPA	USDA appr.	CSRS/ CGCA [1]	Other Federal	Non-Federal [2]	Total
Forestry: New and Improved Forest Products	401	[3] $17.69	$5.62	$1.08	$14.81	$39.20
Fruits and Vegetables: New and Improved Products and Byproducts	403	4.16	1.55	0.21	8.52	14.44
Field Crops:						
New and Improved Food Products	406	6.45	1.21	1.17	6.33	15.16
New and Improved Feed, Textile, and Industrial Products	407	15.40	0.91	0.39	4.13	[4] 20.83
Livestock:						
New and Improved Meat, Milk, Eggs, and Other Food Products	410	4.89	2.91	0.80	12.87	21.47
New and Improved Nonfood Products	411	2.28	0.15	0.01	0.60	3.04
Grand total		[5] 50.87	12.35	3.66	47.26	114.14

[1] Cooperative State Research Service plus contracts, grants, and cooperative agreements.
[2] Primarily State support of the State Agricultural Experiment Stations.
[3] Mainly Forest Service.
[4] Other oilseed crops as well as Miscellaneous and New Crops totals $1.58 million includes $0.56 from USDA, $0.44 from CSRS, $0.06 from other Federal, and $0.62 from non-Federal.
[5] Mainly Agricultural Research Service except for RPA 401—mainly Forest Service.

TABLE 2.—FUNDING TO EXPAND THE DEMAND FOR FARM AND FOREST PRODUCTS BY DEVELOPING NEW AND IMPROVED PRODUCTS AND PROCESSES FROM FIELD CROPS*—FY 1988 CRIS SUMMARY

[Dollars in millions]

	Total	Corn	Wheat	Forage	Cotton/ cottonseed	Soybeans	Minor oilseeds	Misc. new crops
Feed, Textile and Industrial Products	$16.31	$2.13	$0.40	$0.70	$7.77	$2.47	$0.18	$0.38

*Includes USDA appropriated, CSRS administered and USDA contracts, grants and cooperative agreements.

Senator DASCHLE. There seems to be some agreement that more emphasis needs to be put on alternative new crop and market development rather than improved new crop and market development.

I am interested, obviously, as we look to the new farm bill about doing that in a policy formulation.

Dr. Jolliff, what advice would you give us? What would be the one or two things, three or four things for that matter, that we could do precisely in policy that would ensure that 3 or 4 years from now, if we held a similar hearing, we would not be saying exactly the same thing.

As you said, throughout this period, we have really been spinning our wheels and drumming the issue without really making much of an advancement. And people in the Department are obviously very well intended here. But they are limited in resources and in policy.

What specifically in policy could we do to advance our goals?

Dr. JOLLIFF. Well, I do not want to come across as an expert in this system in that, you know better than I, the organizational structure of the U.S. Government.

Senator DASCHLE. We are just asking your opinion.

Dr. JOLLIFF. But I think the key is to have earmarked resources, ever how much Congress would feel should be invested.

For example, I have documented in a paper I published, that in the decade in 1978 through 1987 there was something over $200 billion spent in relation to excess commodities. Congress is going to have to decide how much to invest in getting new crops that would be profitable, and then earmark that so it cannot be whittled away.

Senator DASCHLE. How precisely would you earmark it? How would you earmark it?

Dr. JOLLIFF. Well, I think that is where the gentleman in here from USDA might be able to tell us better, or it might take someone else.

When the former Chief of the Industrial Crops Laboratory of the Northern Regional Research Laboratory tells me that Congress appropriated money to help solve the surplus problem before, and then it got redirected from internal and external pressures on the internal political structure of USDA, I would not want to be so presumptuous as to indicate exactly how that kind of thing can be avoided.

Two years ago I brought to Dr. O'Connell a proposal that I was working on in the State of Oregon for meadowfoam. We were trying to get a joint venture going, like I worked with Procter & Gamble Co. in getting the cuphea joint venture going. The cuphea joint venture is between the State of Oregon through the Oregon Agricultural Experiment Station, the soap and detergent industry, and the USDA.

Well, I came to Dr. O'Connell because he was supposedly the contact point, but there is no formal structure for research funding of new crops. I know he is strapped for funds. I do not know what guidelines or mandates he has, and I am not saying that he should have. But I am just saying, like it has been said here earlier with the ethanol situation, there just is not a stable place to go if you do not have a staff of people to go out and ferret all this out for you, like either major commodity organizations or major research subject matter areas have in the competitive grant system.

If you are a photosynthesis specialist or a nitrogen fixation specialist, you know where the trough is. And if you learn the system and you get going in the system, you can survive, even if it is a pretty tough one to break into, I can guarantee you.

Senator DASCHLE. Your first point is earmark. What would be the second thing you would do, or do you think that would solve—is that the panacea earmark?

Dr. JOLLIFF. Well, I think we in the State system and the Federal system know what it takes to make a crop profitable. We have done it so well, and we have a lot of very skilled people. We have all this technology. I would be cautious that we do not get so enamored with technology that we overlook the need for institutional innovation.

I guess I am here to tell you that I think we have gotten enarmored with technology. I do not want to pick on anybody. But I think biotechnology has been the latest one.

Senator DASCHLE. I think I know how you are going to answer this, but Dr. Jordan has said that out of the $2.2 billion that he says is allocated for research, $125 million is—he did not use the word, but I will—earmarked for alternative research.

What is wrong with that earmarking?

Dr. **Jolliff.** Well, it certainly is not taking a strategic prospective from a new crop point of view. And I——

Senator **Daschle.** So what you are saying is you have it earmarked for new rather than improved crop development, is that it?

Dr. **Jolliff.** If you want new plants developed to produce new things that have a market, yes, you have to. Otherwise, there is no voice to look out for that.

Senator **Daschle.** Dr. Jordan, is there anything wrong with earmarking a couple of hundred million dollars out of your research budget for alternative crop development?

Dr. **Jordan.** I think you would have 59 State and Territorial Agricultural Experiment Station Directors in a riot. But other than that, I suppose the Department would be concerned, if it was that kind of a level. But I think the issue is one of enough visibility and enough in the strategic planning.

And if I could say something about it. Both the State agricultural experiment stations and the Agricultural Research Service have strategic plans. And these plans drive our programs.

Now, for 1989 and subsequent years, you are going to see an increased emphasis because one of those top priorities is to assess new and expanded uses for agricultural products. Again fair enough. There is a mix there of improved or expanded use, and new things that are in here.

But I think the answer of having a focused program of significant size, which the Congress has in fact provided, and some instructions to the Agricultural Research Service, which it has provided at times, is a very good step. I would not want to put all my eggs in that basket. I guess that is what I am saying.

There is a lot of decisionmaking done. Of that $125 million, about $52 million of it is State funding. It is not Federal funding, it is cofunding by the States. And so there is some decisionmaking that you make in Oregon, at Oregon State University about this. So we have some joint responsibility.

But your point about having some visibility, some significant point of contact has definitely been heard. And I think we are moving in that direction.

There are two important points to be made here, one is that of the five priorities of, Dr. Clayton Yeutter, Secretary of Agriculture, one is on new and expanded uses. Fair enough. Again that is mixed.

And the second point is that in a recent Business Week interview of the President's new Science Adviser, Dr. D. Allan Bromley, he also points out that this is extremely important and must have Federal support.

So I think you are going to begin to see, particularly in their first budget, that they are able to influence the FY 1991 budget, you may very well see quite a different perspective in that regard, and that would be, of course, like a beam of sunlight from your point of view, would it not?

Senator **Daschle.** Well, let me ask you this, Dr. Jordan. Would it not be better that moving in this direction is the right thing to do?

The people you mentioned will come and go. We will all come and go. And unless you institutionalize that kind of prioritization and that kind of commitment, with whomever it is that comes in next, we start out with the same dilemma that we have had throughout, that is the inconsistency with regard to the support provided in these areas.

Could we not then be in a much better position over the long term as a matter of public policy, delineate what we are talking about in the legislation itself?

Dr. JORDAN. It is very helpful and, in fact, in the farm bill it has authorized such activities. And to have enough under either direct Federal appropriation for administration or under the special grants program where it can be well directed, either one of those kind of tools is an excellent place to work on.

I might ask my colleagues, Dr. O'Connell and Dr. Tallent for a little fleshing out of that statement.

Dr. O'CONNELL. No. I would agree. I know where Dr. Jolliff is coming from, and he knows some of my frustrations in moving some of these new crops along. And we have, as Dr. Jordan had mentioned, programs in kenaf and guayule, and crambe and rapeseed, we have had to struggle and get resources to work in these areas, for example, in kenaf.

But in regard to the institutionalizing of funding and directing it at new uses of existing crops or new crops research, I think there is some merit for looking at ways to put focus on this. And I know I may have some differences of opinion with Bill Tallent on this. But I do feel in order for us to get the same kind of recognition that Dr. Jolliff is looking for, I think we have to institutionalize this effort.

Dr. JORDAN. Bill.

Dr. TALLENT. I agree with what has been said generally. I think we have more flexibility than we may have admitted to increase our programs in this area. And we are under policy guidance to achieve that increase. I think you will see some increases. I think there may be some danger in saying rigidly you will spend *x* amount in a certain area.

We were locked in that kind of thing in some of our other programs, and that limits our flexibility now when the time is needed to move funds in this direction which we would like to do. So, you know, if you lock this way, you limit future flexibility.

The times are such and the priorities are such that we want to increase this area, and we need to keep the kind of flexibility that enables us to do it.

Senator DASCHLE. But there is such a thing as so much flexibility that nothing gets done, and that is what we are talking about, I guess, Dr. Tallent.

I mean, having minimal amounts of money allocated in a certain area, earmarked as we were discussing, which is obviously examined from time to time for its relevancy and its appropriateness seems to make some sense.

Does anybody have additional comments? I have no further questions.

Dr. Jolliff.

Dr. JOLLIFF. With $200 billion of taxpayer dollars going out in a decade, I think it is a wonderful risk to risk a couple of hundred million.

And when I look at history, and again with all due respect for my colleagues as individuals from the USDA, I cannot find a single instance in the history of this Nation when our public servants in USDA took the lead, outfront, before somebody else was pushing them, to get a new crop growing on behalf of the farmers, and make it profitable so other farmers could have it there and go ahead without a crisis. I think that the system simply works that way. And that is not a reflection on individuals.

Senator DASCHLE. Well, that is quite an indictment, Dr. Jordan. Shall we make that the last word? [Laughter.]

Dr. JORDAN. I think it is fair to say that there are not large numbers of examples. But certainly the example of what we are doing now with guayule, something we have researched for a long period of time, but have not really brought to commercialization. And the building of a plant cooperatively with industry and the University of Arizona, and other universities that have participated in that, certainly has to classify as a very good example of where the Government of the United States has been the catalyst to bring the pieces together.

Kenaf is another example in which there has been a great deal of emphasis, of putting together industry, Government and university scientists to bring out a real world product at the other end. There are several others that I think are promising. I think it would be fairer, Dr. Jolliff, if we said we like to see significantly more of those examples coming down the pike.

Senator DASCHLE. Is guayule an example?

Dr. JOLLIFF. No, I do not think so, Dr. Jordan.

Is it not true that the interest in guayule came as a result of the national threat—I mean to our security in World War II? Is that not why we went to guayule, not because someone was strategically saying we need, somewhere down the road, to get started on this. So somewhere down the road, we could use that to cover excess production capacity in the agricultural sector.

Was it not the crisis, the political pressure of wartime need that caused the emphasis even that was put on back in the forties? Was that not the motivation?

Dr. JORDAN. It was in the forties. It is not today. I think today is more the matter that we need to have a commercially viable latex program within the United States and not be so dependent on other people.

So that is what brings it up high on the priority listing.

Dr. JOLLIFF. Granted. That is very much granted.

Dr. JORDAN. So the USDA, in terms of seeing that, together with the Department of Defense, the universities and the industrial sector, has really gone together to put together a program that probably could not have been put together without that team.

Dr. JOLLIFF. That I would agree.

Senator DASCHLE. I must say we get actual complaints from industry on guayule right now. We are getting letters saying we want you to demand of the Department to move much more aggressively with guayule than what they are. You probably get copies of the same letters.

Dr. O'CONNELL. We do.

Senator, you asked for just a few more comments, and I would like to—this article came out of "Business Week," and it is "Innovation in America." And it points up a couple of things here that has not been talked about explicitly that I think needs to be at least brought into the record.

One of the key things happening is the recognition by Congress, industry and in Government, that if we provide an opportunity for the farmer to grow other than a few crops out there like Dr. Jolliff is talking about, we have to create a market.

And the way that is going to be happening is through private/public sector cooperation. And rather than a synfuels kind of a thing where the Government was out front, that is not what I am talking about. What I am talking about is where industry is leading us. In other words, it is an industry led private/public sector cooperation.

This particular article talks about this in some detail. And it indicates that if we are really going to compete on the worldwide scene with the European Economic Community and Japan we are going to have to learn how to work together with industry.

We do that by industry and Government putting money into developing these technologies, when it looks like they are profitable. Industry will not put their money into it unless it does look profitable.

It is difficult for industry to look 10 years down the road, and that is why Government has to be involved if we are really going to make these things work.

When I was talking about 3 to 5 years, I was not talking about the full development phase. What we were talking about then is like with kenaf. That thing had been worked on for 30 years. Peoria developed the initial technology.

What I was talking about is validating the technologies with the private sector, to go through the testing in their laboratories so they get a hands-on experience along with technical and economic data.

It is necessary for us to work as teams to commercialize promising technologies. The kenaf demonstration project is an example of this. If we are really going to bring new products to the market, we are going to have to work with the universities, we are going to have to work with chemical engineers, we are going to have to work with scientists in laboratories, we are going to have to get the processing people in the plants familiar with this. We must also get the CEO's of companies familiar with the new technology.

The European Economic Community now does these things. I was over there about a month and a half ago. They are putting $80 million right now into joint projects, and they require 50 percent funding from the private companies—this is joint among the universities, industry, and the EEC. They have made this investment over a 4-year period.

They have been to the Peoria lab, they have looked at our program. They have been on the programs at the U.S. Trade Commission over the last 2 or 3 years. They have looked at everything that is going on. They made a decision to put some money into it. Japan is doing the same thing.

Things are happening out there, and I think that we really need to take a hard look at it and do the same.

Senator **Daschle**. Well, listen, we could go on. And I must tell you I learn more at these hearings than I always anticipate learning.

I appreciate the dialog and the exchanges we have had. They have been very instructive for me and very helpful.

I want to thank each of our witnesses. Once again, you have confirmed to me the need for Congress to take a very close look at this issue as we make some difficult decisions about policy in the next farm bill.

So, with that, let me adjourn this panel and adjourn the subcommittee.

[Whereupon, at 11:46 a.m., the subcommittee recessed, to reconvene at 9:30 a.m., Thursday, March 22, 1990, in room SR-332, Russell Senate Office Building.]

PREPARATION FOR THE 1990 FARM BILL

Organic Foods Production Act of 1990—S. 2108

THURSDAY, MARCH 22, 1990

U.S. SENATE, SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION OF THE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room SR-332, Russell Senate Office Building, Hon. Thomas A. Daschle (chairman of the subcommittee) presiding.

Present or submitting a statement: Senators Leahy, Daschle, and Conrad.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator DASCHLE. The hearing will come to order.

We are holding the hearing today to consider S. 2108, the Organic Foods Production Act of 1990. Many people argued that last year's surge in organic food sales was a result of a temporary panic for organic. Yet, this week's Harris poll shows that sales of organic produce continue to climb. Clearly, people want organic food and American farmers are ready and willing to deliver it to supermarkets.

Organic farming takes great ingenuity and commitment. Alvin Schwarze from Milbank, South Dakota, one of many organic farmers in my home State turned 70 years old this year. He has been farming organically for 40 years. Alvin has developed such a sophisticated and successful rotation system that South Dakota State University is now studying it, hoping to better understand his techniques in order to share that knowledge with others.

Like many farmers, Alvin believes we need to set clear standards for organic production so that farmers know the rules and so that consumers are sure to get what they pay for. Alvin joined with other South Dakota farmers and successfully lobbied for a State organic law. At this time, South Dakota is 1 of 22 States with regulations on the books.

While State action represents a positive step forward for organic farming, the differing State laws have also led to consumer confusion and troubled interstate commerce. Today, 15 years since former Secretary Earl Butz warned that organic farming would cause the starvation of millions, there is a new understanding and appreciation of alternative agriculture. There is a great demand for official recognition of organic farming and a groundswell of support for a national organic certification program.

So we have come a long way. Last year the National Association of State Departments of Agriculture passed a resolution calling for Congress to establish a national organic certification program. This January the American Farm Bureau Federation adopted a resolution calling for the establishment of a national labeling standard for organically grown products. And in a few moments, the Center for Science in the Public Interest will deliver petitions from over 100,000 people across the country, calling for a national organic program.

That is why Senator Leahy, I, and eight others have introduced S. 2108, the Organic Foods Production Act of 1990. We are holding this hearing today not to debate whether a national organic program is needed, but rather to debate how such a program could be structured.

I am very pleased with the list of witnesses that we have. It is quite a significant list.

Prior to the time we turn to our first witness, our colleague from California, let me call on our prime sponsor of the bill, our leader, our chairman, Senator Leahy.

STATEMENT OF HON. PATRICK J. LEAHY, A U.S. SENATOR FROM VERMONT

The CHAIRMAN. Thank you, Mr. Chairman.

Before I begin, I want to thank you for holding this hearing and for joining me as an original cosponsor of this important legislation. I think it is extremely important to us, to the whole country, certainly in South Dakota or Vermont or anywhere else.

Consumers are worried about the potential hazards of the foods they eat. Instead of finding safer alternatives on supermarket shelves, they are finding labels that are often meaningless. The labels say naturally grown or organically grown, and yet there are no real standards. People do not know what they are getting, and yet we know, from the latest Harris poll taken this month, that more than four out of five Americans want organic fruits and vegetables and over half are willing to pay more for them.

I think they ought to know what they are getting for their food and right now they do not. With this legislation, we will have a label that will tell them what they are getting. We know that excessive chemical use is fouling our food, soil and water. EPA has found at least 77 pesticides in ground water of 39 States.

Mr. Chairman, I do not want to hold up hearing, I have a full statement which I will submit for the record, if I might.

Senator DASCHLE. Without objection.

[The prepared statement of Hon. Patrick J. Leahy follows:]

PREPARED STATEMENT OF HON. PATRICK J. LEAHY, A U.S. SENATOR FROM VERMONT

Before I begin, I would like to thank Senator Daschle for holding this hearing and for joining me as an original cosponsor of this important legislation.

Consumers are worried about the potential hazards of the foods they eat. Instead of finding safer alternatives on supermarket shelves, they are finding a myriad of confusing and unsubstantiated claims such as "organically grown" and "natural."

The "Organic Foods Production Act of 1990" will help eliminate consumer confusion, provide safer alternatives, and give farmers incentives to use less chemicals.

It has three goals:

1. *Consumers Right to Know.*—A March 1990 Harris poll showed for the second year in a row that more than four out of five Americans want organic fruits and vegetables and over half are willing to pay more for them. *Consumers who want organic food should get what they pay for.*

Currently, 22 States have different regulations for organic foods, which confuses the issue for many consumers. This bill sets one tough national standard. Only foods meeting this standard will be stamped with the "organically produced" label.

What will the "organically produced" label mean? It will mean food grown by farmers without using substances known to be harmful to human health (such as synthetic pesticides, hormones, or antibiotics) or to cause environmental pollution.

2. *A Better Environment.*—Excessive chemical use is fouling our food, soil and water. EPA has found at least 77 pesticides in ground water of 39 States. Farmers are worried that prolonged exposure to pesticides places them and their families at risk.

Organic farming can be part of the solution by promoting ecological farming and improving food safety.

3. *Changing the way we Farm.*—Current farm programs encourage chemical-intensive agriculture by discouraging crop rotations and limiting diversity. This bill will help American farmers shed their dependency on synthetic pesticides and fertilizers.

This legislation has been carefully crafted with input from a wide range of interested groups. This is the reason a majority of Agriculture Committee members are original cosponsors of the bill.

The **Chairman**. I think this is extremely important legislation. I think it does not mean that all food is going to be grown organically overnight, by any means. But what it does mean is that those who want organic food will know what they are getting. For those who grow organic food a solid market will evolve. But for those who are now cashing in on people's desires for organically grown food by falsely representing products as organic, the rug will be pulled out from under them.

I think it is a good piece of legislation and so I applaud you for holding the hearing.

Senator **Daschle**. Well, we are very pleased that you have taken such strong leadership in this area. Not this year, but over the past many years. Obviously your interest continues and without your leadership I doubt that, at least this committee and this Congress, would be nearly as far along as it is.

Let me bring to the table our first witness. Senator Alan Cranston, who has been a real advocate, one who represents the constituency of organic agriculture and sustainable agriculture for some time. He is our leader here in the Senate as well and we are delighted that he is with us this morning.

Let us do the petitions, too. Roger Blobaum is from the Center for Science in the Public Interest and the Director for Americans for Safe Food. He has some petitions and while Senator Cranston is here as well, he is a cosponsor for the bill, let me call on Roger to make his presentation.

Mr. **Blobaum**. Mr. Chairman, the petitions are all in these boxes and we will just make a token presentation here.

These are petitions with 136,000 signatures gathered nationwide by individuals who, among other things, have expressed a strong interest in national standards for organic agriculture.

The **Chairman**. I see a number of these petitions are from States where we have members on the committee, and I think we will make it a point to let the members know how people feel.

Senator **Daschle**. When were these petitions collected?

Mr. **Blobaum**. In 1989, in anticipation of this kind of event.

Senator **Daschle**. And you said there are 100,000?

Mr. **Blobaum**. There are 136,000 signatures.

Senator **Daschle**. We really appreciate you making this presentation. Thank you very much.

The **Chairman**. Thank you very much. That's great work.

Senator **Daschle**. Alan, let us begin with you and then we will let Roger begin his presentation following yours.

STATEMENT OF HON. ALAN CRANSTON, A U.S. SENATOR FROM CALIFORNIA

Senator **Cranston**. I am delighted to have two chairmen here for the moment, and thank you both very much.

The **Chairman**. We are delighted to have you come today. We do not usually get the heavy horsepower in our committee, so welcome here.

Senator **Cranston**. Tom, I am very pleased to have the opportunity to appear before the Senate Agriculture Committee, Subcommittee on Agricultural Research and General Legislation, to testify in support of the Organic Foods Production Act, S. 2108, and to share with the committee the thoughts of Californians who will be affected by this legislation.

As the largest grower of organic produce in the Nation, California has a very keen interest in this bill. The State is home to an estimated 1,200 organic growers who gross over $100 million a year in sales. While this still accounts for a mere 2 percent of the total agricultural production for the State, organic farming is on the rise. California Certified Organic Farmers (CCOF), the largest State organization of organic growers in the country, has seen the number of acres dedicated to organic production more than double in the last 2 years. As of March 1990 CCOF had certified 63,000 acres.

Mr. Chairman, there is enormous potential for growth in the organic farming industry as consumers increasingly demand foods free of heavy chemicals and farmers seek more sustainable agricultural practices. But at the same time there is enormous potential for abuse and confusion about what is "organically produced" if we do not help to provide standards and enforcement on a national level.

Late last year I met with some of the leaders in the California organic community at a gathering hosted by the U.C. Santa Cruz Agro-Ecology Farm Project. The meeting included representatives of large and small farming operations, grocers, shippers and environmentalists. They brought to my attention the fact that real confusion already exists about what organic means, not only among consumers, but among regulators, researchers, chemical companies and the growers themselves. I guess everybody is presently uncertain. Certification is absolutely critical to clarify what organic production means by providing guidelines and standards; however, a farmer does not need to be certified to be a commercial organic grower in California. S. 2108 would make great strides toward coherence and fairness not only in California but across the country by implementing national standards for organic production, a 3-year phase-in of those standards, and mandatory certification. Yet the bill, I am pleased to note, preserves the integrity of organic food programs that have been implemented by States in running organic food certification programs, including programs that allow independent third-party certifiers.

Perhaps the most pervasive concern I heard voiced by organic growers in California was regarding the materials available to farmers and a national list of these materials. In many cases, organic growers, without the benefit of national and State programs dedicated to organic production and research, have had to be their own guides. Many of these growers have taught themselves a great deal and have come to realize the sophistication of organic farming methods. They are concerned that a national list of permitted and prohibited materials reflect that sophistication, that it provide flexibility as well as uniformity. S. 2108 specifies that no fewer than 3 organic growers sit on the 15 member Organic Standards Board, which would establish and amend the national list of approved and prohibited substances. The bill also establishes a 15 member National Organic Board to advise the Secretary of Agriculture on the implementation of the act. Of this board, at least eight would be individuals who own or operate organic farms. While there is some concern about a proliferation of bureaucratic structures, I am pleased with the representation of growers because I believe they have a lot to teach us.

It has also been brought to my attention that interstate commerce and international trade of organic products are severely inhibited in the absence of a Federal law governing organic foods. These are problems that no State law can adequately address. In providing national standards, S. 2108 prohibits one State from discriminating against another that meets those standards. In addition, it directs the USDA to establish a process by which to evaluate the organic standards of other countries.

Finally, I would like to mention the need for research into organic production systems. While S. 2108 does not specifically address broad research of organic systems, the bill does establish a national organic promotion, research and consumer education program which would provide for research relating to organically produced agricultural products.

The growing organic industry deserves good and thorough research. It deserves consistency and definition. It deserves the encouragement and help of the Federal Government. In short, Mr. Chairman, it deserves a fair shake. The Organic Foods Production Act of 1990 would help to provide just those things and I wholeheartedly recommend its enactment.

If the organic strawberries I ate in Santa Cruz are any indication of what is to come, then the future for organic food tastes very sweet indeed.

Thank you again, Mr. Chairman, for the opportunity to testify before this committee.

Senator DASCHLE. Thank you, Alan, for an excellent statement. I do not know if there is a State in the country that represents more of the organic agriculture industry than does California, and certainly with your strong leadership they are well represented in this case.

Let me just ask you about one of the aspects of the organic debate, and that is with regard to residue-free food. Some have argued that in order for it to be labeled as organic, it ought to be residue-free. What is your feeling toward that?

Senator CRANSTON. I suspect that is the case, but I leave that to the experts who know more scientifically about this than I profess to know.

Senator DASCHLE. Some of the farmers in the Midwest continue to argue, skeptically, that organic agriculture really does not meet the viability standards of the rest of agriculture, that it just cannot be done on a viable basis. Do you find organic agricultural activities to be viable, economically, in California?

Senator CRANSTON. Yes. The people now in the occupation are very, very bearish about what they can accomplish and feel that with this kind of legislation to help them, they can prove to be extremely viable and very successful.

Senator DASCHLE. Once again, thank you for taking the time to come over to the committee, and we appreciate your support and your assistance in this regard.

Senator CRANSTON. Thank you. I hope you can report the bill out very soon. Thanks a lot.

Senator DASCHLE. Let us ask Roger Blobaum to come back to the table at this time. Roger, as I said earlier, is the director of the Americans for Safe Food Project of the Center for Science in the Public Interest, and one great petition-gatherer, from what I can tell.

We are delighted you are here and would invite you to proceed as you see fit.

I would like to insert in the record, without objection, the prepared statement of Senator Conrad.

[The prepared statement of Senator Conrad follows:]

PREPARED STATEMENT OF HON. KENT CONRAD, A U.S. SENATOR FROM NORTH DAKOTA

Mr. Chairman, thank you for allowing me a few minutes to make a statement this morning. Senator Leahy has put together an excellent organic foods bill. Producers, consumers, retailers, and the environment all stand to benefit under this act. It is always a pleasure to cosponsor effective legislation such as this.

My State of North Dakota has been a leader in the emerging organic food industry. In 1988 over 50,000 acres of North Dakota cropland were certified organic. One operation alone, the Kirschenmann Family Farms of Windsor, North Dakota, comprises 3,000 acres. Organic food production clearly is not some backyard operation. It is an important sector of the agricultural economy and deserves to be treated as such.

This bill will reassure consumers who want to buy organic foods that they are getting what they are paying for. Just as important, by creating a national definition of organic, this bill will protect true organic producers from those who would market their products as organic without adhering to strict organic production methods.

I am especially pleased that this bill takes a positive, incentive-based approach to protecting the environment. Farmers will reduce or eliminate their use of synthetic chemical inputs if they can do so profitably. By protecting organic producers, this bill will give farmers the confidence to adopt and develop sustainable farming practices.

Mr. Chairman, the Organic Foods Production Act should be part of our farm and food policy for the 1990's. My thanks to you again, Mr. Chairman, for allowing me to speak on behalf of this fine bill.

STATEMENT OF ROGER BLOBAUM, DIRECTOR OF THE AMERICANS FOR SAFE FOOD PROJECT OF THE CENTER FOR SCIENCE IN THE PUBLIC INTEREST (CSPI), WASHINGTON, DC

Mr. **Blobaum**. Thank you, very much, Mr. Chairman.

I should point out that CSPI is a 200,000 member, improved health and nutrition policy advocacy organization. We really appreciated the opportunity to present the petitions in this way.

I will submit my prepared statement for the record and would like to, very briefly, summarize the points.

Senator **Daschle**. Without objection.

Mr. **Blobaum**. We support S. 2108. But we do have some specific suggestions for improvement that are outlined in the prepared testimony point by point.

UNEASY ABOUT DELEGATING IMPLEMENTATION AUTHORITY TO A FEDERAL AGENCY

One of the things, Mr. Chairman, that we are very uneasy about is giving implementation authority to a Federal agency that has long been perceived as being officially opposed to organic agriculture. This is a source of considerable concern.

To deal with that, we feel the bill should be very specific, much more so than most farm legislation; that it should give as little discretion as possible to Federal and State officials as authorized in the bill; and that it should provide for a strong national organic board. There should be no opportunity for weakening the standards during the implementation process.

CONCERNED ABOUT ENFORCEMENT

We also are concerned about enforcement and we strongly endorse the bill's provision for citizen suits. We think it is absolutely essential that these suits be provided by the bill.

Senator **Daschle**. Do I understand you to say that you think the bill still gives far too much discretion to the Department?

Mr. **Blobaum**. We would hope that it could be tightened up a little more, yes, sir.

Senator **Daschle**. I would not ask you to do it now, but I would like to have some specific examples of where you think the bill could be tightened for the record.

Mr. **Blobaum**. I think most of it is in our prepared testimony. If not we will be glad to respond more fully to your request.

STANDARDS

We feel this legislation should provide minimum standards to be met by all who use USDA's label, but that State's should continue to have the right to adopt more stringent standards.

ONE OF THE MOST IMPORTANT SECTIONS DEALS WITH THE NATIONAL LIST OF APPROVED AND PROHIBITED INPUTS AND PRACTICES

One of the most important sections deals with the national list of approved and prohibited inputs and practices. We feel that a strict synthetic versus natural definition should be avoided, and the bill does avoid that. The criteria should be based on whether an input or a practice causes adverse health or environmental effects. The criteria and the process involved in establishing and maintaining the national list are very critical elements of this bill because they deal directly with the standards.

The list should start, we feel, with what certified organic farmers are using and doing now. Then the list should be amended as time goes on, on the basis of science. The process of challenge to some of these materials could begin as soon as the implementation phase begins.

S. 2108 PROVISIONS

This bill provides significant food safety, environmental, and farm market development benefits. I think it is important to note that organic food is a value-added farm product that will help increase farm income. It will encourage environmental stewardship. It will provide important assistance to the emerging organic food industry and facilitate interstate commerce in fresh and processed organically grown food.

We urge you to recommend passage of this timely and important piece of legislation.

[The prepared statement of Mr. Blobaum appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you very much, Roger, for your statement and the contribution you and your organization have made to this effort.

Let me do this. There may be cause for me to go to the Senate floor to offer an amendment within the next hour-and-a-half. So in order to accommodate our witnesses, let me call them to the table and forgo questions until after all of them have testified. If time permits, I would like to bring all of the witnesses back to the table and have somewhat of a roundtable discussions with some questions following, if we could do that.

So with that, let me again reiterate our thanks and we will ask you to come back in a few minutes.

Our first panel consists of three witnesses, Faye Jones of Wisconsin, representing the Organic Farmers Association Council; Mark Retzloff of Colorado, representing the Organic Foods Alliance; and Allen Rosenfeld of Public Voice, representing the Organic Foods Working Group. If those three people could come to the table, we will take their testimony at this time.

Your entire text will, of course, be a part of the record and we would invite you to summarize; in fact encourage you to summarize. If each of you could limit your remarks orally to 5 minutes, we will take your testimony at this time, beginning with Ms. Jones.

STATEMENT OF FAYE JONES, MENOMONIE, WI, REPRESENTING ORGANIC FARMERS' ASSOCIATIONS COUNCIL AND ORGANIC FOODS PRODUCTION ASSOCIATION OF NORTH AMERICA

Ms. JONES. Thank you, Mr. Chairman.

OFAC, the Organic Farmers' Associations Council, wishes to thank Senator Leahy and his staff for developing national legislation to address the needs of the organic farming industry. We are honored to have been invited to share our observation with members of this committee on the Organic Foods Production Act of 1990.

WE ARE SUPPORTIVE OF HAVING NATIONAL STANDARDS FOR ORGANIC FOODS

We are supportive of having national standards for organic foods and support wholeheartedly this process to establish those standards.

THE ORGANIC FARMING COMMUNITY

I will briefly characterize the organic farming community today before detailing some of our concerns.

My name is Faye Jones. I own and operate a 60 acre organic farm near Spring Valley, Wisconsin. I market garden vegetables, flowers and fresh herbs to the Minneapolis-St. Paul area. I have been farming organically for 10 years. The farming practices which I and thousands of other organic farmers use demonstrate that it is economically feasible to produce food while restoring the vitality of the soil.

The organic foods industry is an extremely diverse one which, in addition to the type of production which I have been involved in, includes grain, dairy, beef, poultry and many other crops. Organic farmers can be found in all 50 States, and these farmers are using state of the art operations, ranging from market garden operations to thousands of acres.

Organic farmers were the first to propose and develop standards for the organic foods industry.

Organic farming is a production system developed to work in harmony with natural ecosystems.

OFAC

OFAC, the Organic Farmers' Associations Council is a national confederation of established organic grower organizations. Farms represented by these organizations contain the lion's share of the production base for the organic food industry.

We would like you to know that we organic farmers are dedicated and productive members of our farming community and organic farmers are innovators in the best of American farming.

MAJOR REASONS WHY OFAC SUPPORTS THE BROAD OBJECTIVES OF THE ORGANIC FOODS PRODUCTION ACT OF 1990

There is both practical experience and technical knowledge found in the organic community and organic farmers are committed to farming practices that strive to protect our environment.

The following are major reasons why OFAC supports the broad objectives of the Organic Foods Production Act of 1990.

First, standards are needed to maintain the integrity of the meaning of organic.

Second, dramatic increases in interstate and international commerce requires uniform standards.

Third, uniformity amongst certifying groups is a necessary item.

Fourth, having national standards with adequate enforcement provisions at the State level will allow the organic industry to grow and meet the market demand and at the same time, maintain public confidence in the integrity of the organic label.

CONCERNS ABOUT THE CURRENT DRAFT OF THE ORGANIC FOODS PRODUCTION ACT OF 1990

However, as organic farmers, we have some concerns about the bill as it is written. I will summarize some of these concerns under each title, as follows: Title I, OFAC supports a national standard for organically produced food that builds on the historic principles and practices of organic farming. National standards must provide a clear and comprehensive method to administer the practices and materials defining organic.

A definition of the national list of materials and acceptable practices in the bill is not adequate as it is written. Nor is materials evaluation criteria, certification criteria and the jurisdiction over key decisionmaking processes adequate.

The place of residue testing in certification should be used as a method to verify rather than measure organic farming practices. The accreditation of public and private certifying agents must be equal and fair. The Secretary of Agriculture should have no direct involvement in certification, but rather be responsible for the national accreditation of certifying agents.

Under Title II, OFAC supports the creation of a national board that has representation from the entire industry. We do not support a promotion program at this time. We also do not support the initial or permanent assembly of 208 appointed representatives. We feel as though the board would be adequate.

Also, the level of regulatory complexity created in this title simply is too much. I think we have heard that before.

Titles III and IV, we are looking forward to offering amendments to these titles and there is some concern that these are not appropriate in this bill, that they should be a separate bill or added to something else, that there may be confusion for the consumer about transitional labels.

OFAC SUPPORTS THE PROCESS TO REFINE NATIONAL STANDARDS IN TITLES I AND II

In conclusion, OFAC supports the process to refine national standards in titles I and II. OFAC supports Federal agency involvement limited to oversight of the national accreditation program and cooperative agreements with States to enforce the standards.

Overall legislation should conform to the needs of the organic industry and still protect the public's interest.

Thank you for the opportunity to comment on the Organic Foods Production Act of 1990. We look forward to working with your staff and members of the committee on the markup of this bill. Again, we are honored to have been asked to speak here today and we are really grateful for your commitment to the establishment of this national organic foods standard.

[The prepared statement and the Interim National List of Ms. Jones appear at the conclusion of the hearing.]

Senator DASCHLE. Thank you, Ms. Jones. Mr. Retzloff.

STATEMENT OF MARK RETZLOFF, CHAIRPERSON, ORGANIC FOOD ALLIANCE (OFA), BOULDER, CO

Mr. RETZLOFF. Thank you, Mr. Chairman. My name is Mark Retzloff, and I chair the Organic Food Alliance. I very much appreciate the opportunity to appear before you today to testify on the Organic Foods Production Act of 1990.

OFA

The Organic Food Alliance is a legislative alliance which has been formed in the last few months with representatives of all elements of the organic industry—growers, processors, manufacturers, retailers. We have held organizing meetings around the country—Philadelphia, Washington, Austin, San Francisco—and recently completed policy conferences here and in Anaheim, California where we, as an industry, agreed upon the policy positions presented in my prepared testimony today.

We believe the interest in organically produced food within Congress reflects the growing reality that organic food is no longer a fringe element of American agriculture, but part of its mainstream—and a potentially very significant part of it.

INTEREST IN ORGANICALLY PRODUCED FOOD

There are many reasons why it is significant, but let me point out the two most important:

First and foremost, organically produced food is important for the health choice it affords the American consumer. More than 100 million American consumers say they want to buy organically produced food, but there is no Federal legislation defining what it is. Today it is "buyer beware" for those consumers who want to know if what they are buying is smothered in pesticides or shot through with antibiotics and steroids. That is unacceptable. When we discuss meaningful labeling of organic food, what we are really talking about is protecting the basic right of Americans to control their own health and the health of their families through the food they choose. Consumers have the right to know the purity of the food they are buying so they can control the purity they desire. And Congress has the power to protect that right through enacting meaningful labeling standards and verification procedures. Very simply, the debate over defining and verifying organically produced food should center on how best to protect the consumer's right to know and the consumer's right to choose.

Second, organically produced food is an important form of environmental protection and has the potential to be a very significant means of improving and safeguarding America's valuable land and water resources. The degree to which pesticides are fouling our land and water is frightening—in 1950, American farmers were using roughly 200,000 pounds of pesticides, but by 1985 that had grown to between 1.7 billion and 2.4 billion pounds. In 1945, it was estimated that 7 percent of the crop loss was through insect damage. By 1986, 11 percent of the crop damage was by insects, but we had a 1,000 percent increase in the use of pesticides. Expanding the use of chemical-free methods of controlling pests and maintaining the fertility of the soil--practices central to organic farming—would contribute significantly to protecting our environment.

OFA APPRECIATED THE OPPORTUNITY TO WORK IN DRAFTING S. 2108

The Organic Food Alliance appreciated the opportunity to work with Senator Leahy and his staff as they were drafting Senate bill 2108, and we believe the policy positions we developed at our recent policy conferences will be even more helpful as this and related legislation wind their way through the congressional process.

A WORD ABOUT ORGANIC FARMING AND FOOD PRODUCTION AS WE IN THE INDUSTRY SEE IT

Before I articulate those positions, I want to say a word about organic farming and food production as we in the industry see it. We see ourselves providing a healthful and safe food system by producing, processing and handling foods using practices and materials that promote human health, protect the environment, and sustain the production capacity or agricultural production resources. We believe that these are vitally important national goals and that the Federal Government has a role in helping us achieve those goals by creating nationally sanctioned organic standards, by protecting those standards through an effective certification mechanism, and by promoting the maintenance and expansion of organic farming in this country through appropriate promotion and through changes in current governmental farm programs that are detrimental to transitioning to and maintaining organic farms.

You have a copy of the rest of my prepared testimony, Mr. Chairman, and I would like to summarize a few additional points that were not included. We have just completed a second policy conference and we have a few things that came up this morning that we thought we might bring up to your attention today.

THE USE OF THE WORD ORGANIC

The first one is the use of the word organic. We would like you to change it from "organically produced" to organic. That is the common usage, the jargon that is used right now. We think that would be very simple for people to make that change.

Senator DASCHLE. What is the consequence of doing that? I am not sure I understand the nuance between organically produced and organic?

Mr. RETZLOFF. What we suggest, Mr. Chairman, is that when using the term organically produced, the word produced will be dropped, and the term will be just organic. It is the common use of the word right now.

Senator **Daschle**. A convenience factor, rather than a kind of semantic distinction?

Mr. **Retzloff**. Right. It is the common usage. It is in our culture right now.

RESIDUE TESTING

Second, in residue testing we recognize the fact that we cannot test down to 5 percent of the EPA tolerance level. We just do not have the technology to do that, so we urge that we substitute the language that was brought out in the Oregon organic legislation, which went through rigorous debate over the last few years.

Finally, I want to thank you for allowing us to testify today.

[The prepared statement of Mr. Retzloff and attached summary policy positions and organic industry factsheet appear at the conclusion of the hearing.]

Senator **Daschle**. Thank you, Mr. Retzloff. Mr. Rosenfeld.

STATEMENT OF ALLEN ROSENFELD, DIRECTOR OF AGRICULTURAL POLICY, PUBLIC VOICE FOR FOOD AND HEALTH POLICY, ORGANIC FOODS ACT WORKING GROUP, ON BEHALF OF PUBLIC VOICE FOR FOOD AND HEALTH POLICY, THE NATURAL RESOURCES DEFENSE COUNCIL (NRDC), AND THE NATIONAL COALITION AGAINST THE MISUSE OF PESTICIDES, ACCOMPANIED BY JANET HATHAWAY, ATTORNEY, NRDC

Mr. **Rosenfeld**. Mr. Chairman, I am Allen Rosenfeld, director of agricultural policy at Public Voice for Food and Health Policy, a national research, education and advocacy organization that works for the citizen's interest in food and agriculture issues.

THANKS TO THE COMMITTEE

I want to thank the committee for giving me the opportunity to testify today on S. 2108 on behalf of Public Voice for Food and Health Policy, the Natural Resources Defense Council and the National Coalition Against the Misuse of Pesticides.

COMMEND SENATOR LEAHY FOR TAKING LEADERSHIP ON THE DEVELOPMENT OF NATIONAL LEGISLATION GOVERNING ORGANIC AGRICULTURE AND ORGANIC FOOD MARKETING

Let me also commend Senator Leahy for taking leadership on the development of national legislation governing organic agriculture and organic food marketing. We feel that national legislation on organic agriculture is long overdue and warrants the most serious consideration by the Congress.

OUR ORGANIZATIONS ARE ON RECORD IN SUPPORT OF THE EXPANSION OF ORGANIC AGRICULTURE

Our organizations are on record in support of the expansion of organic agriculture, which we feel promises important benefits in the areas of food safety, farmer and farmworker health, farm income, resource conservation and environmental quality. We believe, however, that organic agriculture will not develop rapidly without the establishment of national standards and the implementation of national labeling, certification, promotion and research programs. S. 2108 directly addresses each of these policy areas.

OUR MAJOR CONCERNS ABOUT S. 2108 HOWEVER HAVE TO DO WITH THE ESTABLISHMENT, IMPLEMENTATION AND ENFORCEMENT OF HEALTH AND ENVIRONMENTAL STANDARDS FOR ORGANICALLY PRODUCED FOOD PRODUCTS

Our major concerns about S. 2108 however have to do with the establishment, implementation and enforcement of health and environmental standards for organically produced food products. We believe that the bill, as it stands, has a number of important shortcomings that need to be addressed, not only in the interest of public health and environmental quality, but also for the sake of maintaining lasting public confidence in the organic food supply.

I will briefly summarize some of those concerns that are found in the written testimony, which we are submitting for the record.

ESTABLISHMENT OF STANDARDS

Regarding the establishment of organic standards that define acceptable inputs and practices for organic agriculture, we have the following concerns:

One, the bill permits the use of synthetic substances in organic agriculture under certain circumstances. We do not feel that that is advisable.

Second, standards for determining the acceptability of toxic natural substances, such as botanical pesticides, are not adequate to protect public health and the environment.

Third, a number of the other requirements in the bill that are designed to protect public health and the environment are so vague that they will render consistent implementation impossible. The bill is loaded with requirements to protect against "unsafe" residue levels; to ensure the "quality and purity" of water; and prohibit "excessive" doses of micronutrients.

Fourth, the toxicity of synthetic inert ingredients that serve as stabilizers, dispersants, and activators for so-called natural pesticides is not addressed in the bill in the way that it should be.

SYNTHETIC SUBSTANCES

Let me say a little bit about the use of synthetic substances, if I may. We believe that by providing for the possible exemption for specific synthetic substances that are determined to not be harmful to human health and environment in the bill could undermine public confidence in the integrity of the national organic label.

Aside from the vagueness of the health and environmental criteria for granting an exemption from the overall prohibition against using synthetic substances, the approval of the use of synthetic materials would amount to misleading consumers. For consumers, organically grown or organic means, without qualification, that the product has been grown without the use of synthetic chemicals.

The standards for determining whether a toxic natural substance, such as a botanical pesticide, should be approved are also so vaguely worded that the bill would not ensure that toxic natural substances that pose a significant and unnecessary risk would not be accepted for use. In addition, the bill fails to provide for a specified expeditious time line for completing toxicological studies on natural pesticides, a number of which are lacking in key toxicological data.

REGARDING THE IMPLEMENTATION OF THE STANDARDS

Regarding the implementation of the standards, our major concern is the unprecedented, and what we feel is, the unnecessary step of empowering an organic standards board that will have substantial organic industry membership with the responsibility of defining which substances should be considered by the Secretary of Agriculture for inclusion in the national list of organic input materials.

Nowhere in Federal public health and environmental regulation is an industry given so much regulatory authority over itself. When hard decisions are made on the national list a board with substantial industry membership may produce decisions that appear to be motivated by self interest. The result could be a loss of public credibility for the national organic program.

A BETTER APPROACH WOULD BE TO ESTABLISH AN INDEPENDENT STANDARDS BOARD

A better approach would be to establish an independent standards board, apart from the proposed research and promotional order in title II of the bill, that would solicit recommendations for national list materials, commission health and environmental impact assessments of proposed materials, and use those assessments to make the final judgments about the composition of the national list. The board should be comprised only of public health and environmental experts and consumer and environmental public interest representatives that have no direct or indirect financial ties to the organic industry.

THE BILL FAILS TO REQUIRE THAT APPROVED NATURAL PESTICIDES HAVE PRACTICAL ANALYTICAL METHODS AVAILABLE FOR DETECTING RESIDUES

In addition, the bill fails to require that approved natural pesticides have practical analytical methods available for detecting residues. Such methods are currently lacking for a number of major botanical pesticides. The problem of contamination of organic foods by inadvertent synthetic pesticide residues from drift or persistence in the soil is also not adequately addressed.

NATIONAL LABEL PROHIBITION

The bill's prohibition of the national label on food that has a synthetic pesticide residue greater than 5 percent of the tolerance level for the pesticide is arbitrary and virtually meaningless since most tolerances have been set without adequate health and environmental hazard data in the first place.

CONCLUSION—S. 2108 NEEDS TO BE IMPROVED IN A NUMBER OF CRUCIAL AREAS

In conclusion, Mr. Chairman, while we strongly support Senator Leahy's goal and the goal of the committee for developing national organic standards that would promote the development of organic agriculture and protect human health and the environment, we nonetheless believe that S. 2108 needs to be improved in a number of crucial areas, some of which I have just mentioned. Others are mentioned in the testimony I am submitting for the record.

Despite our serious concerns, we are very anxious to work with you, Senator Leahy, and the committee to improve the bill and see that strong legislation on organic agriculture moves quickly through the Congress. Thank you.

[The prepared statement of Mr. Rosenfeld appears at the conclusion of the hearing.]

Senator **Daschle**. Thank you, Mr. Rosenfeld.

We thank each of you for your testimony and, as I announced a moment ago, we will call you back to the table if time permits and I am sure that the entire text of your statements will all be made part of the record.

Let me call on our next witness, the Commissioner of Agriculture in Texas, Jim Hightower. We would excuse our panel and ask Commissioner Hightower to come to the table.

The second time in 2 days, Jim. Make it 3, and you will have a permanent chair, I think.

Mr. **Hightower**. A pretty heavy dose of Texas for you, is it not?

STATEMENT OF JIM HIGHTOWER, COMMISSIONER, TEXAS DEPARTMENT OF AGRICULTURE, AUSTIN, TX; ACCOMPANIED BY KEITH JONES

Mr. **Hightower**. I appreciate, Mr. Chairman, this opportunity to squeeze in to your panel's deliberations. Here with me is Keith Jones, who heads our Texas Department of Agriculture sustainable agriculture program and developed our own organic certification program.

WE WANT TO EXPRESS OUR ENTHUSIASTIC SUPPORT FOR THE CONCEPT OF S. 2108

We want to express our enthusiastic support for the concept of S. 2108 by Senator Leahy and Representative DeFazio, with cosponsorship of yourself and the senior Senator from Texas, Senator Bentsen, and others, the Organic Foods Production Act of 1990.

THE BEAUTY OF THIS LEGISLATION

Really, I want to say that the beauty of this legislation is that it literally has sprung from the earth. This did not come from a think tank here in Washington or some well-meaning bureaucrat, but it is really the creative product of farmers and marketers and consumers who have been working at the grassroots level for several years to develop organic standards and certification programs in States like Texas, Vermont, Washington, Arkansas, all across this country.

I COMMEND YOU AND ALL THE COSPONSORS OF THIS LEGISLATION FOR LITERALLY LISTENING TO THE PEOPLE

I commend you and all the cosponsors of this legislation for literally listening to the people, the people who are involved in this exciting and expansive new industry. We are particularly proud to be associated with folks like Roger Blobaum and the Organic Foods Act Working Group, the Organic Farmers Associations Council, the Organic Foods Alliance, the participation of the U.S. Fresh Fruit and Vegetable Association, in bringing not only their intelligence but experience to bear, real-life experience to bear, on the shaping of this legislation.

We are also pleased that you will be listening to those of us at a State and local level, both in the public and private sector, who have been working to nurture this industry and to bring it to full flower.

A BILL THAT WILL WORK FOR EVERYONE

We see, in this bill, the opportunity to produce something that will work, that will work for everyone.

It will work for the farmers who are trying to diversify their operations, trying to convert from a dependency on chemical intensive agriculture. It will work for the consumers who are trying to find a more abundant supply of organic foods that has an acceptable standard of organic in it. It will work for the wholesalers and retailers who are seeking a third-party certified label that they can trust. It will work for the environment and the economy, both of which get an added boost from organic production.

This is an industry that has really grown from the idealism of the 1960's to the burgeoning market realities of the 1990's. The latest data that we have out of Market Data Research, Incorporated in New York says that organic food sales in 1989 was $1.25 billion in sales, a rather substantial niche in our food industry. It also happens to be the very fastest growing segment of the food industry.

THE BUYERS ARE OUT THERE

The buyers are out there. In my State Arrowhead Mills, the largest seller of whole grains and processed seed product, said that their sales have increased approximately 20 percent over the last year, and that they have received twice as many calls from farmers wanting to contract with Arrowhead Mills to grow organic grains than they had last year. Texas Health Distributors, a major wholesaler of organic products, says organic produce sales are up 36 percent from this time last year, and that is double the volume of 2 years ago.

Simon David, a major supermarket chain in our State, says that their produce sales are up 30 percent from last year in organic and that is triple the volume that they had of 2 years ago. No longer is this relegated to the health food stores. It is whole foods markets, fresh——

Senator DASCHLE. It is interesting because just yesterday you were here and the arguments constantly given were that in order for us to be competitive we have to continue to lower the price. I have always associated much higher prices with organic agriculture.

And yet you are telling me that you have seen quite an exponential increase in the growth in the market. That seems to me to be contrary to the constant expertise that we get represented in various ways.

COST IS A RELATIVE ITEM

Mr. HIGHTOWER. Such expertise tends to be very narrowly focused. Cost is a relative item. Consumers are not quite as dumb as a lot of statisticians might want them to be. They know that the cost that they might save or the increased price that they might pay for organic production today is a price that they will not pay in health later on.

HOW MUCH HIGHER ARE PRICES IN ORGANIC FOOD?

Senator DASCHLE. How much higher are prices in organic food?

Mr. HIGHTOWER. It simply depends on the time of the season and the product. In season, organic tomatoes are price comparative with chemically produced tomatoes in our State. We sell organic citrus in the markets. This last season, when it was in season, it was comparatively priced to the other. Organic foods follow the same laws of supply and demand that any other food does.

The reason that organic food is more costly now is because we do not have the supply. The demand is tremendous and we are nowhere near the supply. As that supply comes up, that price is going to come down to consumers.

So that is one of the things that is always tossed out at organic foods that it is going to inevitably cause a tripling of your food prices. It is simply not so. When you get the volume up, those prices are going to go down.

SOME SAY IT IS AN UGLY PRODUCT

Another one, of course, is that it is an ugly product. Which, I would like to introduce some of those dead heads to the marketplace itself, where they can find more beautiful tomatoes that actually have some flavor in them, for example, and maybe some nutrition in them sitting next to tomatoes that are cosmetically produced, rather than organically produced.

This is a product that will compete very, very favorably both in price, and certainly in terms of quality, with a standard product.

Senator DASCHLE. It is a quality issue, is it not? Besides a health issue, you are talking about a consumer's willingness, across the board, to pay more for a quality product.

Mr. HIGHTOWER. Absolutely.

Senator DASCHLE. I think that is true domestically, as well as internationally.

CONSUMERS ARE WILLING TO PAY FOR QUALITY

Mr. HIGHTOWER. No question. And it is not just in this product, it is in all products, the automobile industry and a number of other industries. A Texas poll was done, finding that 87 percent of all Texans say that pesticides on fruits and vegetables present a health risk. That same poll found that 63 percent of those consumers would pay more, willingly, for the product if they could get it. But only about 40 percent were able to find the product that they were seeking today.

So the demand out there is just tremendous and we have these buyers that the market—and as I say, the main stream market, the main stream supermarkets—now have an organic product section within them.

The enterprising farmers are out there responding to that market. We have developed this organic certification program in Texas in 1987, providing this label that can be used by the farmers and by the marketers of a Texas Department of Agriculture certified organic product.

DOES IT HAVE TO BE RESIDUE-FREE IN ORDER TO USE THE LABEL?

Senator DASCHLE. Does it have to be residue-free in order to use the label?

Mr. HIGHTOWER. Yes, it does. We inspect onfarm. We, as a State agency, do the inspections onfarm. It is a requirement, and Keith you can add to this if you want, but it is a requirement of 3 years free.

Senator DASCHLE. So there is no toxicity tolerance, as our previous witnesses were——

Mr. JONES. We currently are using EPA guidelines, at this point, because that is the only legal standard that we have got.

Senator DASCHLE. That is a pretty lose guideline, is it not?

Mr. JONES. But that is the only legal basis that we can operate on.

Mr. HIGHTOWER. That we have at the moment, which is why we are here to support this legislation.

FARMERS CERTIFIED

We had 30 farmers certified in March 1989. Today, we have 140 farmers certified. That is a 450 percent increase in a single year, and we expect 250 farmers to be certified by the end of this year. Farmers are moving dramatically into this. We will have about 1,000 percent increase in the volume of organic production move in to the marketplace this year, and that does not begin to reach the actual potential that is out there.

These are, as I indicated to you yesterday, not just balloon flying hippies out there with half an acre and wanting to do what is right. These are mainstream farmers who are beginning to make this conversion.

MAINSTREAM FARMERS CONVERTING TO ORGANIC FARMING

Jim Crawford, for example, is a farmer out in Muleshoe, Texas, more mainstream than which it is hard to get, on 900 acres producing organic corn, cotton, and wheat for grazing. Seven years ago, he was losing money in the traditional production techniques, about to go under. So he decided to switch to organic just to stay afloat, because it promised to reduce his input costs and promised a higher market price at the time.

It took him about 3½ years to convert. We got him certified about 1987 and it is working. He is getting substantially higher yields today than his neighbors do. You can test his soil and go right across the road and test the soil there. There are substantial differences, in fact, unbelievable differences in soil quality and till.

He is selling his organic corn at 1½ times the market price of regular corn. He is selling it directly to tortilla manufacturers and other buyers in the region, which means he gets the value added to it.

WHOLE NEW INDUSTRIES GET CREATED OUT OF THIS MARKET

Whole new industries get created out of this market, too, and we do not often hear about that. It is not just the producers. There is a group of black entrepreneurs in the central Texas area, Killeen, called Hill Country Food Processors, that are building a processing facility to produce fresh organic vegetables for restaurants and the institutional market. We are working with them to find markets with Wendy's, McDonald's, Cisco's, and other institutional distributors.

The first year potential of this is $2.8 million in sales and 41 jobs would be attached to that processing facility in Killeen, Texas. Forty-one jobs does not solve the national unemployment problem, but it begins to get at it in Killeen. This is a real economic development that produces jobs, produces economic growth.

You have whole new sectors out in Iraan, which is not near Iraq, that is near Odessa, Texas. In Iraan, we have a guy named Jack Parker out there who is raising shrimp in an arid section of our State, using the saltwater that is underneath that old land out there that cannot be used for any other agricultural purpose.

A pure product. Last year he had 2 acres of shrimp and produced 2,400 pounds. This year he is at 7 acres and he will produce 24,000 pounds of shrimp. We are working now to seek an organic certification for his shrimp. The problem is that the U.S. Department of Agriculture is barring that on the basis that there is no scientific test for it, but we can make a production claim for it.

This legislation finally kicks open that door held rigidly shut by the U.S. Department of Agriculture to organic certification of livestock, not only including four-legged livestock but multilegged livestock like shrimp.

So these kinds of entrepreneurs, these kinds of enterprising farmers, the people who are out there on the land are the ones who are devising this legislation, who have brought it to you and Senator Leahy and Representative DeFazio. They will continue to shape it and work with you to produce something that not only works for them, because we are not trying to just do a favor to a few farmers here and there. We are trying to do a favor to this environment, a favor to the consumers, a favor to common sense, and through their enterprise, generate real economic growth that is rooted in our values.

That is why we, in the Texas Department of Agriculture, have been proud to work with these growers, environmental and consumer organizations to come up with something here that will make sense. Now we are pledging to work closely with you in any way that shapes this.

Senator **Daschle**. Jim, what advice would you have for us as we look at this legislation? I am anxious to clarify this with our previous witnesses, but I thought what I was hearing from Roger Blobaum was that there really was not enough control over the Department of Agriculture as this whole program was being implemented.

Yet I thought I heard from a couple of the witnesses who just preceded you that they are concerned about the bureaucracy, the overcomplexity of regulations as it applies to organic and the inability of the organic system to continue to grow with this apparently impractical level of regulatory pressure that some of them must feel.

Where would you like to see it go? Do you want to see more controls, tougher regulations, or are you concerned as some of our previous witnesses appear to be that if this organic system is going to work it still has to be allowed a lot of flexibility as they interpret what it is they have to do?

Mr. HIGHTOWER. We come down on the side of flexibility in the drafting of this first national legislation. I think we can come back and fix it later on and fine tune it.

This is an industry that is growing. No matter what you do, no matter what I do, it is going to grow. The consumers want it. The retailers and wholesalers know that. They are demanding it and farmers are moving in that direction.

We have to provide a framework for guiding this industry in this legislation. I think it is important that we get an act on the books. We have been taking the flexible approach at the State level, and mainly we work constantly with the industry. We maintain a task force.

Our certification program was developed with a task force. We maintain that task force in place. They continue to meet with us, so that we can make adjustments to it. I think that is the only way you can make sensible legislation.

Let us take the best shot at it that we can now. We have a tremendous opportunity, in this farm bill, to pass this legislation. We ought to have it on the books and then continue to work with the industry.

Senator DASCHLE. Are you satisfied with the board as it is constructed here in the bill, or would you like to see a more independent board, as was suggested by Mr. Rosenfeld?

Mr. JONES. I can respond to that, Mr. Chairman.

I think one of the things that we have to look at, we would submit our model which spans the entire food spectrum, so that we are looking at a board comprised of growers, of retailers, distributors, of consumer interest, health specialists and things like that.

As Commissioner Hightower stated yesterday, it is time for a new beginning in American agriculture and that includes representatives of the entire food chain from seedling to the time that it goes on the consumer's table.

Mr. HIGHTOWER. But I do think we have to have as independent a board as we can at the U.S. Department of Agriculture. Our experience has not been all that happy, from a State level, in dealing with them.

Involved in this legislation is the natural beef certification program, and I think you are familiar with some of the history that we had and our natural beef producers have had, in which one had to actually file a freedom of information suit with the USDA, even to get them to acknowledge they had a certification program. We have another producer down there that is now 3 years trying to get a certification and cannot get it.

So there has to be some independence and some flexibility in the legislation. That is why we like the concept that States can administer this and independent agencies can administer this certification program at a local level. I think we have to have as much flexibility in this initial law as we can put in and still have a real law in place, that means anything.

Senator **Daschle**. But you are not talking much flexibility with zero tolerance and no residues. I mean, you must be referring to flexibility in ways other than how one defines organic.

Mr. **Hightower**. Yes, I am indeed, and we are going to continue to work with groups like Public Citizen and the Organic Growers Association. They are continuing to work together, by the way, I am talking about hourly, as you consider this legislation. So I do not think what is on the table right now is necessarily the final conclusion of those organizations themselves.

So I think the organizations are willing to work with you to come to some consensus that may be a happy medium by the time you put something on the floor.

[The prepared statement and attachment of Mr. Hightower appear at the conclusion of the hearing.]

Senator **Daschle**. Well, thank you both. I appreciate your coming. Thank you.

Our next panel is comprised of James Wiers, representing the United Fresh Fruit and Vegetable Association and Harold Alston, representing the Food Marketing Institute. We are glad to have you both. Mr. Wiers, we will take you first.

As I said to the earlier panel, we are delighted to have you. The entire text of your official statement will be made part of the record. We encourage you to summarize, if you can, and we will bring up your colleagues in a minute.

STATEMENT OF JAMES WIERS, PRESIDENT, WIERS FARMS/DUTCH MAID PRODUCE, WILLARD, OH, REPRESENTING UNITED FRESH FRUIT AND VEGETABLE ASSOCIATION, ALEXANDRIA, VA

Mr. **Wiers**. Good morning, Mr. Chairman. I am Jim Wiers, president of Wiers Farms/Dutch Maid Produce. I have been an active member of the United Fresh Fruit and Vegetable Association since 1976 and I have been a member of the board of directors since February 1989. United is a national trade association for the fresh produce industry.

UNITED AND ITS MEMBERS COMMEND CHAIRMAN LEAHY FOR THE INTRODUCTION OF SENATE BILL 2108

United and its members commend Chairman Leahy for the introduction of Senate bill 2108. The Chairman, I believe, has recognized that the increasing concerns regarding pesticide residues in fresh fruits and vegetables would lead to an increase in the demand for and the availability of "organic" foods. At the same time, Senator Leahy, members of this subcommittee and the food industry were concerned that consumers would be confused without a national definition of "organic."

Permit me to emphasize three points:

HARMONIZATION

The first one being harmonization. We are very pleased that S. 2108 would establish a national production standard for organically grown products. However, one of the key elements in this program is the State organic certification program. As now written, the bill makes it very clear that a State organic certification program "may contain more restrictive requirements governing the organic certification of farms and handling operations." If this is to be a national program, the certification program must be the same in each State. In fact, we believe strongly that national uniformity, or harmonization, must be a principal objective of any legislation that will impact interstate trade. Consequently, we urge that this provision be revised so that States may not have a more stringent program.

NATIONALLY CONSISTENT LISTS OF SUBSTANCES

Second, nationally consistent lists of substances. United strongly supports the other key element to the national production standard, a national list of approved and prohibited substances that must be adopted by all the States. It is imperative for the success of any viable organic industry that organic growers in all 50 States have the identical list of approved and prohibited substances. Although the certification program is also extremely important, the American consumers' question will be what, if any, chemical residues may be allowed on organic produce.

For this reason, we oppose clauses (i) and (ii) under subsection (c)(1) entitled, "EXEMPTION FOR PROHIBITED SUBSTANCES." [See page 86 of S. 2108 on page 527.] This would allow the Secretary of Agriculture to add prohibited substances to the list.

Our concern is that these provisions give the Secretary broad discretion to add substances to the list that may not be consistent with organic farming procedures.

Clause (ii) causes us real concern and we have a problem understanding why such language appears in legislation to define "organic." To allow the addition of a chemical to the list simply because a "wholly natural substitute" is not available for production of a crop would virtually give the Secretary the authority to add nearly any chemical registered for use on that crop.

Also, the bill appears to contradict the very exemptions provided in clauses (i) and (ii) when defining the procedures for establishing the National List. This language [see page 28 of S. 2108 on page 469] states that "The Secretary shall not include exemptions for the use of specific synthetic substances in the National List other than those exemptions contained in the proposed national list or proposed amendments to the National List." We interpret this language to mean that the Organic Standards Board would have to first recommend any exemptions. Although this may be all the review necessary for exemptions provided under clause (i), we still have a concern with the exemptions allowed in clause (ii).

This legislation provides for an Initial Organic Standards Board that "shall establish the proposed National List or amendments to such National List." We believe some of the individuals appointed to serve on this Board should have the appropriate academic credentials. For this reason, we recommend that agronomists be included on the Board. We would like to take this opportunity to thank Senator Leahy and his staff for their responsiveness to our suggestion by including in the bill that at least one individual on the Board should be an agronomist. We would hope that more than one would be appointed, since their knowledge will be invaluable.

LOW INPUT DEMONSTRATION

The third point, under low input demonstration, United recommends that title III, Low Input Label Demonstration Program be deleted from the bill. We believe that such a program will only be confusing to the consumer.

This concludes my testimony. Thank you for the opportunity to testify at this time. I will be happy to respond to any questions that you might have.

[The prepared statement of Mr. Wiers appears at the conclusion of the hearing.]

Senator Daschle. Thank you, Mr. Wiers. Mr. Alston.

STATEMENT OF HAROLD ALSTON, VICE PRESIDENT, PRODUCE SALES AND PROCUREMENT, STOP & SHOP COMPANIES, INC., BOSTON, MA, ON BEHALF OF THE STOP & SHOP SUPERMARKET CO.

Mr. Alston. Mr. Chairman, I am Harold Alston, vice president for produce sales and procurement, Stop & Shop Corporation, Boston, Massachusetts. I am here today on behalf of the Stop & Shop Supermarket Company, one of the Stop & Shop Companies. We operate 117 supermarkets in Massachusetts, Connecticut, Rhode Island and Poughkeepsie, New York. We are also a member of the Food Marketing Institute and the Produce Marketing Association.

Mr. Chairman, we have submitted a written statement and I ask that it be made part of the hearing record.

Senator Daschle. Without objection.

FOOD DISTRIBUTION SYSTEM

Mr. Alston. I appreciate this opportunity to appear before you today regarding the Organic Foods Production Act of 1990, S. 2108. Although I cannot address all the specifics of an organic labeling and certification bill that will encourage growers to produce organic product, I am here to talk about the current food distribution system, our company's specific efforts to sell organically grown produce, and consumers' demand for the product.

The food distribution system in this country is very efficient and sophisticated. As a result, consumers spend less than 8 percent of their disposable income for food at home. Our industry's effective use of low-cost volume merchandising has resulted in a substantial savings in the marketing of food. These savings have resulted in a higher standard of living and contribute to our country's economic growth.

THE NUMBER ONE REASON WHY CONSUMERS SHOP AT A CERTAIN FOOD STORE IS BECAUSE OF THE QUALITY OF THE PRODUCE DEPARTMENT

According to FMI's 1989 Consumer Trends research, for the third year in a row, the number one reason why consumers shop at a certain food store is because of the quality of the produce department.

The explosion in consumer demand for produce has been driven by nutrition and dietary concerns spurred by recurrent messages from health authorities to eat more of these items. This market demand has been fueled by the increased availability of items that taste good, are reasonably free of defects, blemishes and insect infestations, look good and are affordable.

MY COMPANY IS ACKNOWLEDGED AS A LEADER IN MARKETING ORGANICALLY GROWN FRESH PRODUCE TO CONSUMERS

I believe it is fair to say that my company is acknowledged as a leader in marketing organically grown fresh produce to consumers. We have shared our expertise with noncompeting retailers in other parts of the country. In fact, last year I spoke on marketing organics to a standing-room only audience at the Produce Marketing Association (PMA) convention. So I can speak with some authority about the challenges facing most retailers in marketing organics.

MAJOR CHALLENGES IN MARKETING ORGANICALLY GROWN PRODUCE

The major challenges in marketing organically grown produce at the retain level today are:

One, there are no uniform national standards. This bill makes progress toward a single, uniform standard to ensure that produce marketed as organic actually is what it says. Without uniform national standards, we will cause a nightmare for consumers who will be confused about differing State standards. Without national uniform standards you will not see a major expansion of organic products into the large chains. This is because different States making different definitions of what is organic discourages any wholesaler or retail grocer that sources product from more than one State from marketing this product. It is essential that national uniformity means just that: no more, no less. The absence of a single national standard for organic produce will be a major obstacle to a greater market penetration.

Second, there is no Federal verification available that signifies that organic signs above product means that it is really organic. It is very important that the Federal Government set and maintain a national inspection system that is free of any conflict of interest and is not controlled or dominated by growers or brokers. Most consumers think that when they see the word organic that absolutely no pesticides or other chemicals have been used at any stage of production. That is not necessarily true.

All organic claims should be verifiable on the basis of good science and full disclosure of chemical and nonchemical controls should be adopted.

All standards must be realistic and enforceable. The bill's proposed across-the-board 5 percent rule that allows synthetic pesticide residues up to 5 percent of EPA allowable levels is potentially false and misleading because it is unenforceable. Therefore, we recommend that a verifiable standard of "No Detected Residues" be adopted in place of the 5 percent rule.

Third, there is insufficient variety and inconsistent supply. Unrealistic expectations from some suppliers and distributors often cause retailers to carry the increased product line only when price, quality and supply allow. We simply cannot operate modern supermarkets without assurance of fully adequate supplies.

Fourth, organic growers' promotional activities need to be established nationwide. It took about 20 years from its introduction for the former Chinese gooseberry to become the modern day kiwifruit in the 1980's. It took expanded production and promotional dollars from kiwi producers in California and New Zealand to educate consumers and convince retailers that valuable shelf space would generate a return on their investment. Those in the organic agriculture community need to realize this and develop their marketing strategies accordingly. To build retail buyer demand, you must create consumer demand. This requires promotional dollars.

ANOTHER CHALLENGE

I believe that market differentiation is a force that must play a major role in expanding sales of sustainable agriculture products. Stores with a shopper base that will support the costlier product through regular purchasers—for whatever reason they choose—will position themselves accordingly in the marketplace. Some specialized, smaller retail chains and independents have already done this. They have chosen organics to create their market image in produce. The large chains have more of a problem: there are several operational barriers outlined in the written testimony that act as disincentives to these companies. These must be solved.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Alston appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you, Mr. Alston.

Let me call back the members of the former panels now, if I could, including Mr. Blobaum.

Ms. Jones, let me just start out by asking you to comment on Mr. Alston's last point. Philosophically, I think he makes a very good point about promotion. You are the only one of the witnesses who addressed promotion, other than Mr. Alston, and you took what I perceive to be the opposite point of view. Why do you feel that promotion is not in order?

Ms. JONES. I think, first off, I want to clarify that I said at this time. I think there is a lot of concern in the grower community about the assessment and how that is going to work.

Senator DASCHLE. Mr. Alston, what is wrong with that?

Mr. ALSTON. I think, and I will go right back to what I said originally, that if you want to promote organics and get organics into the mainstream, you are going to have to do it through the supermarket industry. That has got to be promoted outside on the national level, in order for the customer to come in and demand that product.

Ms. JONES. Do you think it is appropriate for the farmers to pay the assessment to do this promotion? I mean, the markup for produce, the farmers are making the small end of it, and I would like to encourage maybe the promotion to start with the supermarket end.

Mr. ALSTON. I can comment on one thing, and I do not want to get into pricing or markups, because this is not the place to do that, but our company spends approximately $18 million a year just in advertising produce. That is our part of it, and we do advertise organics per se, but you have to do your part of it, too.

My one little message to the Northeast is not going to help, and it only reaches approximately 3 million customers a week.

Senator DASCHLE. Anybody else want to join in the fray, in this case?

Mr. RETZLOFF. I know from our firm, our retail firm in Colorado, we deal with about 25,000 customers a week and I can speak for about four or five other firms similar, but we spend a tremendous amount of money. I think, between the five firms that I can think of, we probably spend close to $400,000 on promoting organically grown products in the last year, which has made for tremendous consumer response to that.

I have to agree with Faye, though, that I think the promotional ability needs to be spread over the entire industry. But I do feel that we need to promote organically grown products to the consumer, that the health benefits, the environmental benefits, the nutritional benefits of it.

One of the things that is very important to note here, Mr. Alston said that we only spend 8 percent of our current income on food. One of the problems that organic food has is that it is not part of the normal food distribution channels. It does not get subsidized as other agricultural products. We have not put any research dollars into it. We do not support the organic growers at the extension end of the business.

They are out there as orphans, so to speak, and so the price of organic food is much higher because of that. That means that we have a tremendous amount of policies that we need to look at to be able to support organic farming, and I think just doing that itself will provide a tremendous amount of promotion for organic foods.

Senator DASCHLE. Would you agree with that, Mr. Alston?

Mr. ALSTON. In a way, yes, and perhaps in a way, no. I guess there is a question in my mind or in the minds of many people as to whether organics do have to be priced higher at a certain level. Our experiences have shown that when the two items are priced the same in the store, the organics will in fact outsell the regular merchandise.

I guess the question in my mind is how much more is a customer willing to spend than for the regular, and that seems to be the barrier. The higher you go, the quicker it slows down. We have featured many items at exactly the same price, whether it be grapes or broccoli or so forth, and we have had no problems selling it. However, there is a resistance as you go up.

Unfortunately, I think that what we end up seeing is that it only sells in the higher income areas, where people can afford to pay the higher price, and I am kind of concerned about people that are in the lower income areas and how are they going to be able to afford this product.

Senator DASCHLE. Good point. How can they afford it?

Mr. RETZLOFF. One of the things that we have discovered in our surveys of our customers is that once you get to about the 20 percent level is where the demand begins dropping off. I think we do need to work with the organic farming community to provide some of the things that I have just spoken about.

I think we have to really look at what the true production costs of agriculture are, particularly for organically grown products. We have a lot of other costs that are going into our farm products which we do not put into the price of the product when it gets to the shelf. And the organic farmers do put the true production costs into it.

At some point, that is going to have to be a discussion that we have with our farm and our food policy here. I think that has the essence of this question.

Senator DASCHLE. I want to get off to some other points here, but let me just summarize my perception of what I am hearing. You all feel, with the exception of Ms. Jones—well, you all feel, even with Ms. Jones, that promotion is a fairly significant part of what must be done here. You would suggest that we hold off on promotion for a period of time. I sense that the bulk of the rest of you feel that promoting it now is very important.

Do I also understand that most of you believe that the producers themselves have to bear part of the responsibility for that promotional effort? I think everyone would agree with that, except Ms. Jones. Do you disagree with that, right? I do not want to put words in your mouth.

Ms. JONES. I, of course, think that we should pay for part of it, but if we are paying all of the assessments, we would be the ones paying for all of this particular promotion program.

Senator DASCHLE. Let me move on to another point. The transition to organic labels. There are conflicting views about the transition to organic label. Who wants to go first, in defending it or opposing it? Mr. Blobaum.

Mr. BLOBAUM. We feel that a transition label should be tried on a demonstration basis, on a limited basis in a few States.

Senator DASCHLE. You support the demo program?

Mr. BLOBAUM. Yes. But we do not support the low-input approach because we do not know how you can define that.

Senator DASCHLE. You support the demonstration approach, but not the low-input approach?

Mr. BLOBAUM. Demonstration for the transition.

Senator DASCHLE. Does anyone disagree with that? You are all unanimous in that?

Mr. ALSTON. Mr. Chairman, from a supermarket point of view, we find it almost impossible to handle a regular product, an organic product and a transitional product all at the same time.

Senator DASCHLE. What would you do?

Mr. ALSTON. We would handle just one or the other. We handle the organic and the original, conventional, chemically grown.

Senator DASCHLE. So all these labels would cause more compartments?

Mr. ALSTON. Just more confusion for the consumer.

Senator DASCHLE. Now I am hearing something else. A minute ago I thought I heard you all agree that having those categories made sense. Then Mr. Alston said well, that is not going to work at the supermarket and now you all agree that we ought not do it. Is that what I am hearing?

Mr. RETZLOFF. I do not agree with Mr. Alston. I think that our experience is that we have been able to do three or four labels with the produce and that the consumer will pay a premium for what they perceive is something that is a little bit superior. We carry a conventional product, which is not labeled. We will carry something that is transitionally organic and we will carry something that is organic, and the consumer makes the choice.

Obviously, if we can find organically grown products, we will buy that before we will buy the transitional organic. But I do not think that we need to penalize the farmer who is in the transitional stage of going from conventional to organically grown products. I think that we need to be very careful and concerned and caring for those people who are making that transition. They cannot just go cold turkey for 3 years and foot the additional cost.

Senator DASCHLE. Is it really cold turkey, Mr. Retzloff? Why don't they have the opportunity to market their products in the normal channels, like everyone else, during that period of time?

Mr. RETZLOFF. I think that they do, but if they are doing it organically for those 3 years and we have a standard of a 3-year transition, their costs might be a little higher initially in making that transition. And at that point our consumer is going to make the choice to buy that or the conventional produce.

Now I am not in favor of a list type of a label, because I think that that does not make much sense. But a transitional label, we have marketed it in our stores and I know a number of other people who have done that and done it very successfully. The consumers understand what it is.

Senator DASCHLE. Mr. Blobaum.

Mr. BLOBAUM. Our support is based on the fact that we feel that there should be national incentive, if possible, for farmers to make the switch and this is one way of possibly doing this, if it works.

Senator DASCHLE. So you support the concept only as a demonstration, not as a permanent feature? I mean, if it proves that there is not really marketing viability in having this transition label, you would then be prepared to come back to the committee and say look, it is not working, we do not want to do it anymore?

Mr. BLOBAUM. That is correct.

Senator DASCHLE. So you are doing it for informational purposes, is that it?

Mr. BLOBAUM. Both to gain information and to see if this is the kind of incentive that could work to help organic producers.

Senator DASCHLE. What is wrong with trying to find out? Mr. Alston.

Mr. ALSTON. Let me make a point, Mr. Chairman, or two points. We do support the transitional grower, but we sell it as regular product. We are willing to support any grower that is trying to go organic and we will support him in that way.

Second, the American people, about 15 years ago, decided that they did not want packaged produce anymore and they prefer bulk, to be able to choose their own individual pieces. If you go to labeling, you are forced to go back into a packaging program, which does not enjoy good sales, and we ran into a lot of spoilage.

So therefore, in order to be able to sell bulk you are limited to two ways of selling it. You either sell it strictly organic or as regular product. The modern supermarket does not have enough room to expand all of these and give you three kinds at one time. There just is not that kind of refrigerated space in a store today.

Senator DASCHLE. That sounds like a pretty good response. You do have some practical limitations in a grocery store.

Mr. RETZLOFF. I do not think it is necessarily three different choices. I think that you might only have two choices or only one choice. If you are buying red delicious apples, you can buy organic but they are not available so you buy transitional organic, you are only going to have one choice. I do not think that we would put three different kinds of red delicious apples out, but we might have two which is the transitional organic and the conventional apple.

So I think that I agree that you cannot put out too much of your shelf space, but I do feel that transition has a place in the market.

Mr. WIERS. I am not sure but I believe that I am one of the few grower/shippers here this morning. The problem that we would have as a grower would be one of how transitional are we? Are we 1 year away from conventional, 2 years away from conventional, 3 years away from conventional, or organic.

Senator DASCHLE. You get a lot of variance. I would think that the third year would be a whole lot better product than the first year.

Mr. WIERS. That would be a matter of interpretation, yes. I sympathize with the retailer in that he needs a consistent supply. He cannot have a 1-year transitional today, a 3-year transitional tomorrow, a conventional the following day and organic the day after. His problem is one of supply.

If a local retail chain is dealing with 3 or 5 or 10 stores, you have one problem. When you start dealing with the national chains, and there you are talking about 100 stores, 200 stores, maintaining the supply for those stores that is consistent and is one that can be properly labeled in all stores would be very, very difficult.

As a grower, I would work in the transitional stage, but I would be in a position where I would have to make them aware of just exactly where we were and then leave it up to the discretion of the buyer as to how he chose to label it.

Senator DASCHLE. So the dilemma is pretty simple. The dilemma on one hand, as presented by the producers, you need some incentive economically to make it through a transitional period for what amounts to about three growing seasons. The dilemma for those who buy is how many different compartments am I going to have to create here.

While I understand the need to compensate, do you compensate the first year the same as the third year, and you are getting all kinds of labels here. Pretty soon you are going to need an index for apples. I do not know that we will resolve that this morning, but this has been a pretty good exchange.

Mr. WIERS. Along the same lines, we raise approximately 38 different items today. Those are packaged in about 80 different packages. Just the logistics of trying to keep track in a cold box as to which particular field this item came from, if this came from a field that was 1 year, 2 years, 3 years, this would be a nightmare that I would not want to deal with.

Senator DASCHLE. Let me ask you this, Mr. Alston. When I go into my Safeway, I have 1 percent, 2 percent, whole milk, skim milk, lactose milk, condensed milk. Do you have all of those?

Mr. ALSTON. Yes, we do.

Senator DASCHLE. For a guy who has all that milk, why would you be opposed to all those apples?

Mr. ALSTON. Very good question. Unfortunately I do not deal directly with the dairy. I do have some experience that I can relate to you, but all of those containers of milk only take one row apiece. When you get into selling bulk produce, it is a little bit different. You cannot give an apple one row, it just absolutely gets lost out there. So we do have to give it more than one row, and we give it usually a bushel display. It takes 2 to 3 feet to do it.

Mr. ROSENFELD. Mr. Chairman, before you move on, could I add something, another dimension I think needs to be considered.

One of the things that makes it very, very difficult for farmers that are trying to either move out of conventional chemical dependent methods of producing food into what we might call sustainable agriculture methods or even as far as organic methods are the existing food grading standards. As the food grading standards stand, with their emphasis on cosmetic quality, if you do not go all the way to organic and have a label for your product, then it becomes very, very difficult to sell your product in the market if, in fact, you are not using the kind of chemical dependent methods that will get that perfect looking apple.

I know Mr. Alston generally is supportive of growers who are making that transition, who would like to change their practices, but Mr. Alston is pretty exceptional within the supermarket industry as I understand it.

Senator DASCHLE. Quite an endorsement.

Let me move on to another question, and that is the authority that the bill gives the Secretary to add prohibited substances. It is in the bill. There seems to be some conflicting concern about whether or not that is a good idea or not. Mr. Wiers makes it a pretty emphatic part of his testimony that it ought to be deleted. Does every agree with Mr. Wiers? Unanimity on that issue?

Ms. HATHAWAY. I would like to introduce myself. I am Janet Hathaway, an attorney with the Natural Resources Defense Council. Mr. Rosenfeld asked me to join this discussion.

We feel very strongly that consumers are counting on organic food to be really very different, both in the environmental impact it has, and also in food safety. If substances that are synthetically produced can end up being used in organic agriculture, we think that consumers are going to feel betrayed if they find that out. We do not want to walk down a path that will ultimately lead to consumers not wanting to trust organic growers, and I think that that is what could happen with this formula in the bill.

Senator DASCHLE. Let me just play devil's advocate. I am not sure how I feel about it, but I can see a case in some products that you just cannot do it organically for the moment. I mean, it is just not there. What this says if it is not there, the Secretary has that kind of authority to produce.

Mr. Alston, I think, made a very impressive point a while back, if you are going to market you better have a lot of products there. You cannot just have a couple of tomatoes and maybe some kiwifruit. You are going to have to have a range of products.

I thought that was fairly persuasive. Now I hear you saying well, but we do not want to expand our product line even in the most extreme circumstance where a Secretary says look, there is no other way to produce this at this point, so it is either this product or none at all.

That is the way it reads in the bill.

Mr. ALSTON. It could be this product or this conventional product. That is one point. Second, I have had the opportunity in the last year to address a lot of consumer groups around the Northeast at their request and to talk about organics because we were a leader in that area.

The conception of almost every consumer group that I have addressed is that when you talk about organics, the only thing applied to them is horse manure. They do not believe there is anything other than that applied to that product. As far as they are concerned, it is as pure as the white driven snow.

Ms. CODY. I would like to address, too. My name is Lynn and I also am a representative of the OFAC group. I have been a technical consultant to the organic industry for about 10 years. My job is to go into the field and advise farmers on the practicalities of how to grow organic produce, and I come from Oregon.

This debate about whether or not to allow synthetic materials at all has been raging in the organic community for about 15 years. We have not had any technical help at all from the regulatory agencies. We have not had a lot of help from State departments of agriculture. We have not had a lot of help from the land-grant universities to solve this. We have just been relatively in the dark trying to figure out what to do on this.

We recognize that our consumer constituency feels that or believes that in many cases we do not use synthetic pesticides at all. We definitely do not—we are very careful about the materials that we use in all cases. In every State that has a certification program, the materials are very carefully screened.

However, because the types of formulations that are available to farmers are very, very limited, we already start with a very small amount of practical approaches to solving pest problems. We are very willing to continue to explore this issue as an industry and we are looking forward to receiving more help from regulatory agencies.

In fact, in the State that I come from, in Oregon the department of agriculture has recently designated this issue as the most important issue for organic growers and has given a $20,000 work contract to explore this issue. We hope to be able to come up with a more concrete system for evaluating organic materials in the future that will give step-by-step guidelines for being able to have a peer review of this and have help from other government agencies as well as consumer groups involved in this. It will be a very industrywide thing.

Senator **Daschle**. Let me just see if I understand what you all are saying. You all with unanimity agree that there ought not to be any discretion given the Secretary to allow for any kind of substance exception. That is a fair statement?

Ms. **Cody**. I believe that it must be done with input from the organic industry.

Senator **Daschle**. What, do you mean provide any exceptions?

Ms. **Cody**. Well, whenever there is changes to the rule it has to be done with great care that the organic industry will not be destroyed or practically put out of business. As we have seen with many of our commercial growers, that happens easily. We have less tools to start with.

Senator **Daschle**. I tell you what, I have been around for a little while and I know that when the bankers would come or the S&L people would come and say, we ought to be the ones to decide which exceptions we are allowed, more than one eyebrow gets raised.

Ms. **Cody**. I understand that, but I think the Leahy bill already has a good mechanism for providing for input from the organic industry. I do not think that should be the only input. I feel that consumer voices and agronomic voices and scientific voices are an important part of the whole process. I feel that the materials review board in the Leahy bill provides for that adequately.

Senator **Daschle**. Would you all agree that you would not accept any tolerance? We do have some tolerance acceptability here. Would you eliminate the tolerance provision in this bill entirely?

Ms. **Hathaway**. We think it is very important that the way the Leahy bill is structured; that is, not to say that anything that is below 5 percent is necessarily OK and is organic. It is just that whenever something is above 5 percent, for whatever reason, even if it is not because of anything that the grower himself or herself has applied to the field, that cannot be sold as organic. So it is not automatically saying that things are organic whenever they are low residue, and that is an important point.

Senator **Daschle**. Do you disagree with that Mr. Retzloff?

Mr. **Retzloff**. The practicality is that we do not live in a pristine world any longer. We have a lot of things out there that we cannot even detect down to 50 percent of the EPA level in an accurate manner.

I think if we had the testing ability to be able to do that, that might be a proper way to look at it, but it is not available right now. We just do not have that kind of capability.

Senator **Daschle**. So in other words, the definition of organic is somewhat of a—in your case, is not a term we can apply based upon tolerances?

Mr. **Retzloff**. I think that we can—I think we have to be realistic about it, and I think in the Oregon organic legislation—and

Lynn could probably speak to this—they have done a few things to address that. So it is not based on just the EPA tolerance level. It also talks to the FDA action level and it also——

Senator DASCHLE. But Hightower's people said EPA is the only game in town.

Mr. RETZLOFF. That is not the only game in town.

Senator DASCHLE. It is not?

Mr. RETZLOFF. No.

Senator DASCHLE. What other official standard is there?

Mr. RETZLOFF. I think there is the FDA level. There is the level of quantification of a particular——

Senator DASCHLE. In other words, you have FDA and EPA in conflict on tolerance acceptabilities?

Mr. RETZLOFF. No.

Ms. CODY. No, they regulate different types of pesticides.

Senator DASCHLE. That is right. So there is not any overlap there.

Ms. CODY. Right.

Mr. RETZLOFF. What I am trying to get at is we cannot arbitrarily say if it is above 5 percent it cannot be organic. I do not think that is a realistic way for us to look at residue testing.

Senator DASCHLE. But were you not one of the hard-liners just a minute ago who said the Secretary should not have any discretion on whether or not a substance ought to be accepted, exempted at times?

Mr. RETZLOFF. Exactly.

Senator DASCHLE. That seems to be in exact conflict.

Mr. RETZLOFF. No, I think——

Senator DASCHLE. On the one hand you are saying the Secretary should not have any opportunity to have some discretion here. On the other hand you are saying, well, it is 5 percent give or take 50.

Mr. RETZLOFF. No, I am not saying 5 percent give or take 50. I think, though, that there are levels of quantification for certain types of residue levels which we cannot get down accurately, we cannot get down to a 5 percent level. We just cannot test to that level yet. We do not have the sophistication.

Senator DASCHLE. Does everybody agree with that?

Mr. WIERS. No.

Senator DASCHLE. You do not agree with that, Mr. Wiers?

Mr. WIERS. I do not believe so, because any of the chemicals that are being used today by a conventional grower, we already have mechanisms in place that will measure the presence of those residues.

Senator DASCHLE. Mr. Alston.

Mr. ALSTON. I think the bill applies to 5 percent of the EPA allowable standards. If the standard was 2 parts per million, I do not think we have the ability to test 5 percent of that.

Ms. HATHAWAY. We normally do. It depends on the tolerance. For most of the old tolerances that were set, they were set very high. And our methods of detection have improved greatly over the period of time, so that, for example, the alar tolerance, you can detect less than 1/1,000th of the tolerance. So it is not true that routinely we cannot detect 5 percent of tolerance, but for some new tolerances that might be an issue.

Ms. CODY. We have been discussing this quite a bit and we saw that there were two cases. Indeed, some chemicals you can test adequately enough to detect 5 percent of the EPA level. Some you cannot, as Janet has said.

Senator DASCHLE. How can we write it into law?

Ms. CODY. Here is how. We propose that we have a specific wording change for the Leahy bill that in the cases where you can test down to 5 percent, that that be the absolute level at which above it you cannot sell that produce as organic. For those which that requires too much technical sophistication at this time——

Senator DASCHLE. You are talking about a golden parachute for the legal community it seems to me.

Ms. CODY. What we are proposing is that it just be done to the limit of quantification as defined by somebody——

Senator DASCHLE. Can you not imagine the lawyers going at it for years and years saying, well, we do not have the ability. The other lawyers say, of course, we have the ability, look here.

Ms. CODY. It is defined by a specific—using the testing methods of either the USDA or the EPA or the FDA depending on who seems to be the appropriate Federal agency. So with those three caveats it seems to cover all the legal——

Senator DASCHLE. We will take a look at it.

Ms. CODY. This is the wording we used in Oregon and the lawyers there did not argue.

Senator DASCHLE. That is because they know what is coming if they do. Mr. Blobaum.

Mr. BLOBAUM. Mr. Chairman, I think there are two larger issues involved in this discussion. One is the real concern that many of us share that the Secretary, some Secretary, will give into pressure and water down the standards by adding things to the list. That is the first thing.

The second thing is, we do not want to see organic farming by neglect, by people who just do not put on certain things and then claim they are organic. That is not what organic agriculture is. This legislation needs to cover both inputs and practices. So those are two kind of general concerns that are involved in all of these comments.

Senator DASCHLE. Let me move on to the last point I want to raise at the hearing for now. That deals with how much—actually, let me fold in the two concerns I have. One is the independence of the board. And second, the authority of the Department to regulate all of this. In the regulatory mode now, we have the board and we have the Secretary and the Department of Agriculture. Let me take it one piece at a time.

In terms of the board, does anybody disagree that there ought to be a much more independent peer review than what may be the case in the bill?

Mr. RETZLOFF. I think there needs to be—I think I can agree it needs to be more independent. I think it needs to be much more smaller—a smaller group. I do not think we could find 208 people out there in the organic community, including all the public interests and environmental concerns.

Senator DASCHLE. Do you all agree?

Mr. Alston. Not quite, Mr. Chairman. We believe that it should be regulated by the U.S. Government and that we should be careful not to have any growers on the board because I do not believe you can have the cat watching the cream.

Senator Daschle. Ms. Jones.

Ms. Jones. How can you know if it is going to work for the farmers if you do not include them in the process? I mean, ultimately we are the ones that are affected.

Mr. Alston. I think that you can get input from the farmers. I think that it is possible to get the necessary input that you need, but the certification should come through the U.S. Government, based on input but not have a grower be part of the board.

Senator Daschle. At all?

Mr. Alston. At all.

Ms. Jones. I would disagree.

Senator Daschle. Do I find disagreement here?

Mr. Rosenfeld. Strong agreement here.

Senator Daschle. What is that?

Mr. Rosenfeld. As we said in our testimony earlier, we feel that the board, organic standards board, whatever you want to call it, should be completely independent of the organic community.

Senator Daschle. Does completely independent mean no input on the board by organic producers?

Mr. Rosenfeld. No, it does not mean that—in our written testimony we lay out a way in which you could accomplish the objectives of protecting public health and the environment and also get input. It would be ridiculous to cut off the community that is going to be using the inputs, the community that is going to be marketing the products from that process. They just should not be placed in the position of having to make the controversial, what amounts to value judgments about what is acceptable with regard to protecting public health and the environment.

We feel that the existing Organic Standards Board, which is tied into the National Organics Board which is then tied back to the National Organics Assembly, might have cause for acting in what might be perceived to be their own self-interest. And that ultimately would undermine the credibility of the whole program.

Senator Daschle. Ms. Jones.

Ms. Jones. I think it is really unfair to think that organic farmers are not committed to a clean environment and a safe place. We are innovators in what we are doing. We are the ones that have come up with this creative solution to this problem. I do not think it is fair to all of the sudden say, nope, nope, now that it is a big deal—I think that farmers that use organic farming methods are committed individuals to a way——

Senator Daschle. Can you really argue, Ms. Jones, that in all cases they are going to have the public interest at heart instead of their own personal self-interest? I have not seen an interest group yet that——

Ms. Jones. You could never say that everybody——

Senator Daschle. That is what we are talking about.

Ms. Jones. But I think that right now the organic farming community—it is going to grow, and I think that we do have to have safeguards for that.

Mr. **Retzloff**. I think we can say the same thing about any group though; the public interest groups, the environmental groups. They do not always necessarily have everybody's interest at heart. I think that what we need is a group who reflects many different, varied views on this issue. I do feel though that it is essential that the people who are actually utilizing these methodologies and these materials, their input is essential in how it—and their livelihood is also at stake with this thing.

Senator **Daschle**. But your suggestion is there ought to be some balance.

Mr. **Retzloff**. Exactly.

Senator **Daschle**. Mr. Alston's point is well taken, but so is Ms. Jones, that there ought to be a role to play at the table for everyone who is obviously affected and interested in the procedure.

Ms. **Cody**. From a practical point of view as a person who has been involved with this regulatory activity at the State level, we found that States are actually very happy to have organic farmers at the table because we are the ones with the experience and the knowledge and the background to be able to make the decisions and to provide them with the information that allows them to make adequate decisions that will suit the industry and allow it to grow.

Senator **Daschle**. The second part of the last question. I do not understand what some of you were telling me about regulation and the Department's role here. I thought I heard somebody say—Ms. Jones said, regulatory complexity was far too much of a burden for organic farmers. I thought it was Mr. Blobaum who said, we just cannot—we have to tighten up on the regulatory and administrative process.

In other words what I heard you saying is that we ought to give more power to the regulators to do the job they must to ensure that we attain the objectives of the bill. Is that not in conflict?

Mr. **Blobaum**. I was referring, Mr. Chairman, to the authority of the National Organic Board and the standards board and so forth. I still want to very strongly express concern about placing this program in an unfriendly agency. I think that this is something that really has to have a lot of consideration.

If this were a cotton program, no one would be concerned about any of these things because USDA has always been extremely friendly and willing to promote cotton. That is not the case with organic agriculture. I think that this whole industry places itself in a position where there is a lack of trust and that we are somewhat fearful of what will happen with this program if these safeguards are not built in. That is why we feel strongly about the board and about giving the Secretary virtually no discretion; only as much as you have to.

Senator **Daschle**. You are in favor of significant regulation as long as it is handled by a board which you believe is going to be responsible and—or I should say, responsive in meeting the needs of the industry?

Mr. **Blobaum**. Yes.

Senator **Daschle**. Does anyone oppose that? In others words, Ms. Jones, were you not saying that you thought that the bill presented the prospect of far too much regulation?

Ms. JONES. Right. There has to be some regulation. I think that our concern is more directly related to giving all the power to the Secretary. I do think that there are places where it could be simplified some.

Senator DASCHLE. Anybody agree or disagree with that?

Mr. ROSENFELD. I think there is a need to reemphasize, even though we agree with Roger and CSPI, that the least amount of discretionary authority that is given to the Secretary is probably an advisable step to take because of the past hostility. We also feel, however, that we cannot go along with the blanket statement that less regulation is necessarily better.

There needs to be regulation, particularly with regard to the question of the health and environmental impacts of inputs and practices that are going to be recognized under this program and that are ultimately going to be verified in the eyes of consumers by giving producers and marketers an organic label. So some regulation is needed.

I also want to add that we are not trying to attack the integrity and the motivation of the organic industry. There just simply is no precedent for giving any industry the kind of input and the kind of power in determining what could have an effect on health and the environment as there is in S. 2108. We feel that that needs to be addressed.

Senator DASCHLE. I think that, in all sincerity, this is a concern that proponents of the bill are going to have to address. What did you say, the cat watching the cream?

Mr. ALSTON. Mr. Chairman, just one comment from a supermarketer's point of view. That broccoli that is organic or broccoli that is chemically grown comes into our store, it is virtually impossible to tell the difference. So we have two problems.

At the supermarket level, we have to be extremely careful of how we handle it, and also at the growers end and the shippers end, because there is no way without a strong regulation and certification program to tell us which is truly organic and which is not. That is the main concern I have today. When I get a case of broccoli, I do not know whether it is organic. It may say organic, and I can test it and find no residues, and I have to assume that it is organic.

Senator DASCHLE. You are ultimately the one who the consumer would hold accountable.

Mr. ALSTON. That is correct, they come right back to me.

Senator DASCHLE. Mr. Blobaum.

Mr. BLOBAUM. I do not know whether you call this regulation or not, Mr. Chairman, but certainly the audit trail has to be absolutely foolproof. The recordkeeping and all those things that responsible, certified organic farmers do today should be written into this bill and should be absolutely insisted upon. I would not characterize that as regulation, though. It is just part of the certification system that we have.

Ms. JONES. That the farmers themselves have set up and participated in. I think we do not want to lose sight of the fact that certification is really the means for the integrity of the industry.

Senator DASCHLE. But see, you are talking about—you are taking a retrospective look at your industry, and you do have, I think, a very good retrospective reputation. Prospectively—let us assume this continues to grow by leaps and bounds and Corporation XYZ from Switzerland comes in and does not hold the same high standards that you do, and becomes a dominant force on this little organic board that is now cut from 200 to 20, and then begins marketing.

What assurance does the consumer have, or does your industry have, that you are going to be able to maintain quality control under those circumstances?

Ms. **Jones**. They would not be able to pass certification standards.

Senator **Daschle**. If all that was doing it was that 20-member board and they were able to conjure up whatever votes necessary to get 11 of the 20 votes. Now that is not to say that that same thing would not happen in the Department. But the point is to have that balance somehow. Having somebody watching the watchers, and vice versa, seems to me to be pretty important.

This has been a good hearing. I appreciate the testimony by everybody. The record will be held open if anybody has additional comments to make.

[Whereupon, at 11:20 a.m., the subcommittee recessed, to reconvene at 10:45 a.m., Thursday, March 29, 1990, in room SR-332, Russell Senate Office Building.]

[Material submitted for inclusion in the record follows:]

APPENDIX

PREPARED STATEMENT OF ROGER BLOBAUM, DIRECTOR OF THE AMERICANS FOR SAFE FOOD PROJECT OF THE CENTER FOR SCIENCE IN THE PUBLIC INTEREST (CSPI), WASHINGTON, DC

Mr. Chairman, I am Roger Blobaum, director of the Americans for Safe Food Project of the Center for Science in the Public Interest (CSPI). CSPI is a nonprofit organization that has 200,000 members nationwide and advocates improved health and nutrition policies. We actively support policies that encourage the production and marketing of food grown with minimal use of chemical inputs, locally grown food, and certified organic food. I appreciate this opportunity to present our views on S. 2108, the Organic Foods Production Act of 1990.

I want to begin by presenting petitions bearing signatures of 136,000 consumers who support the purposes of this bill. These signatures were gathered throughout the nation in 1989. Individuals circulated and signed the petitions to demonstrate their strong desire for a national program to set organic standards and to promote the production of organically grown food.

We commend Senator Patrick Leahy for proposing this comprehensive legislation, the first of its kind in the Senate, and for actively soliciting input from consumer, environmental, organic grower, and other organizations during its development. Although we support S. 2108 in its present form, we are taking this opportunity to suggest changes that would make it even better.

Establishing a completely new program through legislation requires important tradeoffs. We believe this bill strikes a reasonable balance between strong national standards that guarantee the integrity of the organically grown label and the ability of organic growers to meet them; between the authority given to the Department of Agriculture to implement this program and the constraints needed to prevent it from watering down the national list of permitted inputs and practices; and between the desire to delegate program authority to the States and the need to guarantee the independent status of public, private, and private/public certification agents.

We are very uneasy about delegating implementation authority to a Federal agency long perceived as being officially opposed to organic agriculture. We urge you, therefore, to make this bill much more specific than most farm legislation and to give as little discretionary authority as possible to the Federal and State officials who will implement it.

Because of this concern, we urge you to strengthen the national organic board provided in title II. We would like to see this board significantly reduced in size, and we would like it to have more monitoring and regulatory authority. This scaled-down board should be given jurisdiction over the organic standards board provided and over a similar accreditation board that we believe should be established to oversee the certification agent accreditation process. Sufficient consumer representation should be required on these boards to assure that those who purchase organic food have an effective voice in the decisions made.

For similar reasons we support the bill's provision for citizen suits that would enable consumers to go to court to enforce the standards specified in this legislation. We are not convinced that USDA will have the inclination or the resources to guarantee the level of enforcement needed to ensure the integrity of the organic label. There is precedent for citizen suits in existing State organic statutes, they are included in most national environmental legislation, and they have been effective in getting laws enforced. We feel it is both necessary and appropriate to provide them in this program.

National standards that facilitate the movement and sale of certified organic food in interstate commerce are one of the important features of this bill. It is essential at the same time, however, to guarantee the right of States to adopt standards more stringent than those this bill provides. The Federal legislation should provide minimum standards that must be met by those using USDA's organically grown label. States that want to adopt stricter standards and provide their own label as well should have the right to do so.

Probably the most difficult challenge this bill addresses is providing a method of establishing and maintaining a national list of approved organic production inputs and practices. Although some feel a strict synthetic vs. natural definition should be adopted to determine what should be approved and what should be banned, we feel this is unrealistic and falls far short of what is needed. This definition is inconsistent and difficult to defend since it is based on historic use rather than on scientific evaluation.

The criteria for putting something on the list or taking it off should be whether or not the input or practice causes adverse human health or environmental effects. The criteria must be specific and quantifiable. It is essential that the bill provide a formal science-based process, including the right to petition and appeal, for making these determinations. It also should protect growers from sudden and arbitrary list deletions that would make it difficult on short notice to find alternatives.

We endorse the provision allowing demonstrations of a "transition" label for production that meets all organically grown requirements except completion of the required 3-year withdrawal from use of synthetic fertilizers and pesticides. Although the extent of consumer acceptance of a "transition" label is not known, we believe it would be useful to find out whether food bearing this label will command a higher price and provide a financial incentive to farmers making the transition to organic methods. We have serious reservations about demonstrating a "low input" label because we feel it cannot be defined in a way that is meaningful to consumers. For that reason, we recommend dropping this provision from the bill.

Expanding consumer interest in organically grown food makes this legislation timely and necessary. This expansion is documented by national surveys. A new Harris poll released this week shows 30 percent of those surveyed had made changes in their food buying habits, 28 percent had sought out organic produce or produce grown with limited use of chemicals, and 44 percent reported they would pay more for organically grown produce. The Fresh Trends 1990 consumer survey conducted by *The Packer,* the trade publication of the produce industry, found that 26 percent of the consumers surveyed reported they had changed their food buying habits because of chemical residues. A majority said they preferred organically grown food even if it cost more. And 11 percent said they had sought out and purchased organically grown food in 1989.

High prices and limited access to organically grown food have been cited in recent surveys as serious consumer problems. It seems clear from the evidence available that consumer interest is high enough to support the niche market for organic food that now exists. It also appears likely that this market will develop into something much more substantial in the future.

Certified organic food is becoming an important value-added farm product. The actual farm value is difficult to document because so much organically grown food is sold directly to consumers, marketed in negotiated arrangements with small volume buyers, or simply sold as conventional food. A natural foods industry survey shows the volume sold in natural food stores quadrupled over the last 10 years. The most comprehensive study available, completed recently by Marketdata Enterprises and reported in *The Wall Street Journal,* shows organic food sales jumped 40 percent in 1989 to a level of $1.25 billion and are expected to increase another 34 percent this year.

We believe S. 2108 provides important food safety, environmental, and market development benefits. There is strong evidence that it will encourage environmental stewardship, provide important assistance to the emerging organic food industry, provide market incentives to encourage the adoption of organic and sustainable farming methods, and facilitate interstate commerce in fresh and processed organically grown food. We urge you to recommend passage of this important and timely legislation.

The Organic Farmers Association Council

Testimony to the Subcommittee on Agricultural Research and
General Legislation, Committee on Agriculture
Nutrition and Forestry

March 22, 1990

Mr. Chairman, The Organic Farmers' Associations Council wishes to thank Senator Leahy and his staff for developing national legislation addressing the needs of the certified organic foods industry. We are honored to have been invited to share our observations with members of this committee on the Organic Foods Production Act of 1990. We seek a national standard for organically produced foods. However, as organic producers we also have significant concerns about the Bill as it is written. I will briefly characterize the organic farming community today before detailing our concerns and suggested ammendments.

My name is Faye Jones. I own and operate a 60 acre organic farm near Spring Valley, Wisconsin. I grow vegetables, herbs and flowers for markets in Minnesota and Wisconsin. As an organic farmer for ten years, my customers know that I provide products of the highest quality that are certified organically grown. I farm this way because of my commitment to a healthy environment. Without a whole and vital environment our future and our children's future is in jeopardy. The farming practices which I and thousands of other organic farmers follow demonstrate that it is economically feasible to produce food while restoring the vitality of the soil.

Together with 200 other farms in Wisconsin, I am a member of the Wisconsin Organic Growers Association. WOGA, along with similar organizations in other states, supports certified organic farms growing organically produced foods. For years organic growers' groups were among the few places where the technical support for learning and improving organic farming practices could be found by farmers. As the organic farming community matures in the 1990's we are heartened by, and concerned for the growth of our industry.

Organic food industry is an extremely diverse one which includes, in addition to the type of production which I have been involved in, the production of grain, dairy, beef, poultry and fruit crops. Organic farmers can be found on intensive truck farms supplying retail and farmers' markets in cities all over the country. Organic farmers can be found in the production breadbaskets of our country, raising crops and livestock in state-of-the-art operations ranging from hundreds to thousands of acres.

Examples include Ferrari Farms in Linden, California, a mixed nut and vegetable farm, Kirschenmann Family Farms in Medina, North Dakota, a 3000 acre grain and livestock farm, or Harlow Farms in Bellows Falls, Vermont, a 60 acre mixed vegetable farm. Organic farmers market directly to consumers, to retail stores, wholesalers, brokers, packing plants and processors. Organically produced foods are distributed throughout the United States and to other countries.

Organic foods have rapidly growing international markets. European importers buy the majority of certified organic grain produced on the high plains. Japanese department stores and restaurant chains import our certified organic products. Developing countries are producing certified organic product for export markets. Major food shows in North America, Europe and Asia now include organic products.

Key Policies of Organic Agriculture

The organic foods marketplace has taken form within an environment dedicated to internal regulation of growing and handling practices. Organic farmers were the first to propose standards for organically produced foods and developed most of the certification programs responsible for the considerable integrity of the organically grown or produced label. The following key policies are the foundation of the organic foods community:

1. "Organically produced" is defined as an entire production system, and is not just a safe content claim.

> From the first state statutory definition of "organically grown" (Oregon, 1973), until the most recent (Oklahoma 1990), the word organic has been a production claim, describing a set of principles and practices which define organic farming systems. Only by addressing production practices will materials which degrade the environment or pose hazards to human health be controlled or replaced.

2. The organic foods community is committed to recordkeeping and certification as the best and only way to truly protect consumer rights to know.

> Certified organic farming and handling practices should be documented from the soil to your table and be verifiable. Recordkeeping in organic certification programs track materials and practices used in the growing, handling and marketing of organically produced foods.

3. Organic agriculture tends to incorporate the true production costs of environmentally responsible agriculture.

> Historically higher farmgate prices for organically produced foods reflect the fact that costs which are externalized or subsidized elsewhere in agriculture have come to be internalized in organic agriculture.

These fundamental policies have shaped the organic foods marketplace with remarkable consensus from grower, marketer and consumer groups committed to organic foods. The organic foods community continues to uphold these basic tenets.

Organic Farmers' Associations

The Organic Farmers' Associations Council (OFAC) is a national confederation of established organic producer organizations. Farms represented by these organizations contain the lion's share of the production base for the organic food industry.

We hope, over time, to introduce you to representatives of every segment of the organic farming industry. We would like you to know that we are dedicated and productive members of our farming communities. We also live in the home states of each and every one of you.

Some of the organizations convened under the OFAC confederation include:

Virginia Biological Farmers
Maine Organic Farmers and Gardeners Association
Biodynamic Farming and Gardening Association
NOFA Massachusettes
NOFA New York
Organic Growers of Michigan
Organic Crop Improvement Association of Kansas
Ozark Organic Growers Association
NOFA Vermont
California Certified Organic Farmers
Organic Growers and Buyers Association
Oregon Tilth
Mountain State Organic Growers and Buyers (WV)
NOFA New Jersey
NOFA Connecticut
Washinton Tilth
Organic Crop Improvement Association (OCIA) International, Inc.
OCIA Pennsylvania
Carolina Farm Stewardship Association
Wisconsin Organic Growers Association
Florida Organic Growers
Northern Plains Sustainable Agriculture Society
Farm Verified Organic
Ohio Ecological Food and Farming Association
Ohio OCIA
Colorado Organic Producers
Kansas Organic Producers
Organic Foods Producers Association of North America

Under the auspices of the Organic Foods Production Association of North America, these farmers' associations formed a national confederation as OFAC in 1989 to address common interests in the development of a national standard for organic agriculture. The areas of broad consensus across the organic producer community is reflected in our positions on a variety of issues concerning the national standard for organic. We share broad policy objectives with the Organic Foods Alliance. We are pleased to stand with other sectors of the organic foods industry, and with consumer and environmental interest groups presenting testimony with us today. This process of national consensus building on the definition and regulation of organic agriculture is still in process and the industry is changing very rapidly. Fortunately, the founding principles and practices of organic farming have remained and will continue to remain constant.

Organic Farming Principles and Practices

Organic Farmers Associations Council offers a definition of "organically produced foods as follows:

"Organic food productions systems are developed in harmony with natural ecosystems to achieve stability through diversity, complexity, and the recycling of energy and nutrients.

Organically produced foods are grown according to strict, published standards on soils that meet stringent soil qualification criteria. They should be grown, harvested, preserved, processed, stored, transported and marketed according to nationally sanctioned practices, using only those materials listed in a forthcoming "National List".

The integrity of the "organically produced" label should be protected by accredited certification programs which include annual third party inspection of farms and food handlers, a rigorous documentation system, and clear verification procedures. Organically produced products must meet all local, state and federal regulations governing the safety and quality of the food system."

The scientific and agronomic responsibility of Modern Organic Agriculture:

While the principles and practices of organic food production have been practiced for many, many hundreds of years, it is important to note that organic farming today is a modern science that incorporates the wisdom of traditional farming principles and practices. Many organic farmers have advanced degrees in related agricultural sciences. Organic farming systems have evolved tremendously even since the early 1970's, incorporating the fruits of on-farm research and new technologies in mechanical weed control and integrated pest management, for example.

The level of knowledge in science and agricultural practices is very high in organic production. Because organic farming has had little attention until recently from agricultural research institutions and input manufacturers, organic farmers have often had to be active researchers themselves. Furthermore, the nature of organic farming requires great attention to detail in fertility management, weed and pest control.

Organic farmers are innovators in the best tradition of American farming. They are not afraid to apply new information or experiment with new tools for organic farming systems. What distinguishes agronomic responsibility in organic agriculture is that such experimentation must conform to sanctioned practices of certified organic farming.

Modern commercial farming of economic crops is a complex science. Farming economically with practices that do not violate but in fact enhance natural biological systems is even more complex. Organic farming practices generally avoid the use of synthetically manufactured materials (synthetic pesticides and fertilizers for example). In their place naturally derived materials are used as well as time honored practices of crop rotation, mechanical cultivation and reliance on natural predators of harmful insects.

In the 22 states that have laws defining organically produced foods or state programs certifying organic farms, the distinction between "synthetically manufactured" and "naturally derived" materials has been upheld. In the developing science of organic farming however, implementing the synthetic/natural distinction has not been clear or simple. The two primary examples of this difficulty are suspected toxic naturally derived materials and materials that are synthetic analogs to naturally derived materials.

Insecticides derived from plants called botanical insecticides are an example of toxic naturally derived materials. Most certification programs restrict and regulate the use of botanical insecticides. The use of synthetic materials analogous to naturally occuring products is occasionally permitted in organic farming when there is no suspected environmental impact and the product is not readily available from natural sources. Some inert indgredients found in purchased inputs used by organic agriculture are synthetically manufactured. There is consensus in the organic industry that these synthetic materials must be either replaced or closely regulated. In spite of the complexity in determining what materials should be allowed in pursuing the goals of organic agriculture, there is general agreement on materials in the separate organic certification programs found across this country.

Most established organic certification programs have evolved materials lists which contain approved, restricted and prohibited materials. These lists are administered by private or public third party agencies to consider additions or deletions as problem materials or new materials need consideration. The list of products is constantly reevaluated by certifying agencies, and new products are added only after an exhaustive review of scientific information relating to the product in question. Despite the fact that these programs have evovled without a national standard up to now, there is a 90% congruence among major certification programs, as surveyed by the Technical Committee of the Organic Foods Producers Association of North America in 1989.

As materials lists become a regulatory tool for organic certification programs, the evaluation criteria for deciding what to add or delete to a materials list has become critical. We seek to maintain the highest quality national review and evaluation procedure with criteria and a flexible decision making process agreed to by farmers, handlers, marketers, consumer and environmental groups.

In conclusion, there is an important body of both practical experience and technical knowledge found in the organic farming community. The organic foods industry has remained fully and irrevocably committed to improving farming practices that strive to protect the environment and promote soil health. Certified organic producers and certification organizations have worked closely with the organizations in the private and public sectors to develop comprehensive guidelines for materials and practices that constitute today's commercial organic farming. The organic industry is working with counterpart industries in Europe, Canada, Central and Latin America and Asia to develop a framework for standards reciprocity between nations.

Why National Standards Legislation is Needed for Organic Agriculture

Organic farms must comply with multiple, separate state certification programs today. For example Cascadian Farm in Washington State must work with certification programs in six different states. Livestock operations such as Coleman Beef in Colorado have encountered great difficulty obtaining federal approval for an organically grown livestock label. Consumers and retailers are confused about the meaning of organic since there is no national standard.

Major reasons why OFAC supports the broad objectives of the Organic Foods Production Act of 1990

1. National Standards which define the materials and practices used to produce organic foods are needed to maintain the integrity of the meaning of "organically produced" as more farms, more handlers, and more consumers become interested in environmentally responsible production of food products.

2. Dramatic increases in interstate and international commerce requires uniform standards and accredited certification of organically grown foods so organically produced commodities which cross state and national boundaries are known to be produced with one set of standards. Nonetheless, states must have regionally adapted materials and practices and be allowed to certify farms with stricter than the federal standard.

3. The proliferation of organic certification programs, which until now have had general conformity of standards, must operate by the same criteria to assure even monitoring of materials and practices for organic production.

4. National standards with adequate enforcement provisions at the state level will allow the industry to grow to meet market demand while maintaining public confidence in the integrity of the organic label.

Concerns about the current draft of the Organic Foods Production Act of 1990.

The Organic Farmers' Associations Council is ready to offer amendments to the Bill as written. Principal concerns to be offerred as amendments from the producer community are summarized under each Title. Our testimony concludes with positions on the roles of public and private sector involvement in the maintenance of standards for organic production.

Title I: National Standards

OFAC supports a national standard for organically produced food that builds on the historic principles and practices of organic farming. Many individual organic farmers and groups have commented on draft language for a national standard in the Bill. The national standard must provide a clear and comprehensive method to administer the practices and materials defining organic agriculture. Definition of the "National List" of materials and acceptable practices in the Bill needs further refinement. Materials evaluation criteria, certification criteria and jusisdiction over key decision making processes need futher clarification. We offer such clarification below.

1. National List

We embrace the concept of basing the criteria for determining the acceptability of materials on the distinction between natural and synthetic origins of materials. However, we recognize that proprietary non-disclosure of ingredients, particularly inert ingredients, makes such a determination problematic for some products. For this reason the "regulated" or "restricted" materials category found in many certification programs should also be included in the National List.

We also recognize that some products containing synthetic additives currently have no totally natural substitutes and the prohibition of these materials would have a significant negative impact on the industry. For this reason we support a five year period for the Interim National List including currently approved materials. The five year period was chosen to reflect the time needed to replace these ingredients with naturally derived substitutes.

We support the apropriation of research money specifically earmarked for developing allowable substitutes for these products.

a) Add in Section 111 (b) (1) the additional category of "Approved and restricted substances which constitute the accepted organic practices and materials as determined by the National Organic Board.

b) Incorporate restricted use of materials by specifying conditions for use(s) of such materials in the list.

c) Refine procedures for exempting or prohibiting materials on the National List with a materials evaluation prioritization and procedure modeled after Oregon State Department of Agriculture and the Organic Foods Production Association of North America. See attached document "Tne Interim National List".

d) Give the National Organic Board full authority to set the evaluation prioritization and procedure described in c) above.

e) Change "Secretary" to "National Organic Board" in Section 111 (c) (1) (A) and (2) (A), page 27.

2. Residue Testing:

The place of residue testing in certification should be as a check on and not as a measure of organic farming practices. Such testing is an enforcement tool, used when additional verification is deemed necessary by the certifying agent or the governing State official.

Organic Farmers' Associations Council
Testimony to Senate
March 22, 1990

2. Residue Testing (continued):

   a) Insert the following language after Section 118 (b) "For unintentional contamination of organic products, where no prohibited materials have been knowingly used by the farmer or his or her agent in accordance with this law, no processed or unprocessed food shall be labelled as "organically produced" which has any pesticide residue in excess of 5 percent of the current Federal, or where there is zero tolerance, 5 percent of the current federal Food and Drup Administration action level or the current limit of quantitation used by the most stringent testing standards of either the USDA, EPA, FDA or any other laboratory.

   b) Costs of residue testing is an enforcement tool and must be borne by states as part of the cost of enforcement.

   c) Define contamination as finding more than the maximum level of a prohibited or restricted material in soil, water or foods tested. Remove all reference to "harmful".

   d) Remove all references to residue testing as basis for standard

3. Natural and Ecological:

   a) Eliminate all reference to these terms

4. Livestock and processing standards:

   a) Authorize National Organic Board to refine standards as they are developed by the industry. Fruit and vegetable production standards are more fully developed at this time.

5. Irradiation:

   a) exclude specifically

6. Who can certify?

   a) private, public and private/public partnerships may all certify and there may be multiple certifiers in one state.

7. Who must be certified?

   a) Farms and processors must be certified and must develop plans.

   b) All other handlers must participate in certification documentation and verification.

   c) There is not a consensus on the question of exemption from certification but if certification is mandatory, there must be provision for lower cost to small producers.

8. Accreditation of certifying agents:

   a) The peer review process should be managed by the National Organic Board, not the Secretary.

   b) Expertise required in peer review process should include program administration, organic certification procedures, inspection and oversight capability.

Title II: National Boards

OFAC supports the National Organic Board representing the industry, the scientific community, consumer and environmental interests to oversee the maintenance of the national standard for organic production and the accreditation of certifying agents. We question the need for a promotion program at this time. We are concerned with the level of regulatory complexity created in this title.

Title III: Low Input and Transition Label Demonstration Program

We do not support the inclusion of the Low Input Label Demonstration Program in this Bill. The idea of such a program is worth exploring but it will just confuse matters to have it in this Bill. We also question the need for a transition to organic label because it may lead to confusion in the marketplace about certification.

Title IV: National Laboratory Accreditation Program

We are concerned by this title because it places a cost and regulatory burden on small labs that may be unbearable. However, we support the need for a common standard for laboratory testing.

Conclusion:

The Organic Farmers' Association Council supports a reworked version of Title I and Title II addressing a national standard and creation of a National Organic Board. Federal agency involvement should be limited to oversight of the national accreditation program and cooperative agreements with states to enforce the standard. State governments should be in a primary enforcement role with the option to have state certification programs. Private certifying agents should be accredited to operate programs in one or more states under the national standard and according to criteria for certification. The national accreditation program should be inclusive of grower, marketer, consumer and environmental group representation in a rigorous peer review process. Overall, legislation should conform to the industry's needs at this point in its development while protecting the public interest in establishing a standard for organic production in the United States.

Thank you for the opportunity to comment on the Organic Foods Production Act of 1990. We look forward to working with your staff and members of the committee in the markup of this Bill.

THE INTERIM NATIONAL LIST

1. The materials that represent the historically approved materials of the organic industry must be the basis for the Interim National List.

2. This Interim List must be in place for at least five years before establishing the National List.

3. The Interim List will be divided into three categories:

   a) Approved Materials:

      Materials approved for use.

   b) Restricted or Regulated Materials:

      Materials may be used only under specified conditions. This category must be written into the list (eg. "(named material) except for..., or "(named material) only if..."

   c) Prohibited Materials:

      Two classes of materials would be on this list. The first class is prohibited naturally derived materials. The second class of prohibited materials is the great majority of synthetic active ingredients.

MATERIALS EVALUATION PRIORITIZATION:

During the first five years the Organic Foods Production Act would:

1. Set up the Board for making materials decisions
2. Develop and test decision format
3. Start evaluation of list with the following priorities:
   - A. Allowed
   - B. Regulated
     - 1) Botanicals (do Rotenone first)
     - 2) Other regulated substances
   - C. Prohibited
     - 1) natural prohibited

MATERIALS LIST EVALUATION

2) We may evaluate other prohibited substances but the process will be constructed to reflect the principles of agronomic responsibility of organic agriculture. At this time, we expect that only a few products with synthetic active ingredients will be available for use.

Materials Evaluation Prioritization (continued):

D. New Products
  1) Natural
  2) Natural derivlatives
  3) Synthetic analogs of natural materials
  4) Compatible synthetics but only when requested by 10% of the representatives of the designated decision making body.as being consistant with the principles of organic growing systems.

BEGINNING THE EVALUATION PROCESS

We will begin our decision making by placing a material in one (or more) of these categories:

1. Natural--Mineral and organic products obtained from natural deposits, plants, or animals that since their extraction have only been subjected to mechanical and physical treatments with the aim of isolating, purifying, or concentrating a particular ingredient.

2. Compatible Synthetics--those which are compatible with the methods and practices of organic farming. They have been compounded or manipulated by processes which are not deemed to be "natural" (ie chemical synthesis). to be placed in this category, a material must have been recommended by 10% of the representatives of the designated decision making body. All synthetic materials in current use by the organic industry (on the OPFANA list) will be considered in this category to begin the process.

3. Incompatible Synthetics--All synthetics will be placed in this category initially and will not be evaluated until they have been requested for evaluation as mentioned in #2 above.

4. Inerts--Because we are prevented from obtaining information on these ingredients by FIFRA, we must exempt them from evaluation until we can legally obtain the information or pesticide manufacturers vulunteer it to us. We will work on:
  a) encouraging manufacturers to enclose inerts.
  b) encouraging products which are suitable for organic agriculture by formulation of the most crucial materials and by working with manufacturers to develop new acceptable materials.
  c) Because information from federal regulatory agencies is sketchy and difficult to obtain, and FIFRA reform is beyond the scope of this Bill, we are committed to using the marketplace as a way to reward manufacturers that formulate products which are suitable for organic farming by creating a brand name list of products which meet our stringent standards. Products must:
    1. have disclosed inerts;
    2. use only inerts from EPA list 4(a)
    3. notify NOB if formulation changes.

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TESTIMONY OF MARK RETZLOFF, OFA CHAIRPERSON

ON THE ORGANIC FOOD PRODUCTION ACT OF 1990 (S. 2108)

BEFORE THE

SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION

OF THE SENATE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY

MARCH 22, 1990

Mr. Chairman and Members of the Committee. My name is Mark Retzloff, and I chair the Organic Food Alliance. I very much appreciate the opportunity to appear before you today to testify on the Organic Food Production Act of 1990, which seeks to address an issue of significant concern to a growing number of Americans -- how they can be sure the food they buy is truly organically produced.

The Organic Food Alliance (OFA) is a legislative alliance which has been formed in the last few months with representatives of all elements of the organic industry -- producers, processors, distributors and retailers. We have held organizing meetings around the country -- Philadelphia, Washington, Austin, San Francisco -- and recently completed policy conferences here and in Anaheim, California where we, as an industry, agreed upon the policy positions represented in my testimony today.

OFA's purpose is to provide policymakers with the benefit of our experience and

RECYCLED PAPER

perspectives in hopes that they will be helpful in formulating legislation and regulations which ensure a meaningful and enforceable definition of organically produced food. We believe the interest in organically produced food within Congress reflects the growing reality that organic food is no longer a fringe element of American agriculture but part of its mainstream -- and a potentially very significant part of it.

There are many reasons why it is significant, but let me point out the two most important:

> 1) First and foremost, organically produced food is important for the health choice it affords the American consumer. More than 100 million American consumers say they want to buy organically produced food, but there is no federal legislation defining what it is. Today, it's "buyer beware" for those consumers who want to know if what they are buying is smothered in pesticides or shot through with antibiotics and steroids. That's unacceptable. When we discuss meaningful labeling of organic food, what we're really talking about is protecting the basic right of Americans to control their own health and the health of their families through the food they choose. Consumers have the right to know the purity of the food they're buying so they can control the purity they desire. And Congress has the power to protect that right through enacting meaningful labeling standards and verification procedures. Very simply, the debate over defining and verifying organically produced food should center on how best to protect the consumer's right to know and the consumer's right to choose.

2) Second, organically produced food is an important form of environmental protection and has the potential, expanded, to be a very significant means of improving and safeguarding America's valuable land and water resources. The degree to which pesticides are fouling our land and water is frightening -- in 1950, American farmers were using roughly 200,000 pounds of pesticides, but by 1985 that had grown to between 1.7 billion and 2.4 billion pounds. Moreover, more than 600 species of insects, mites and pests related to agriculture had become resistant to one or several of the major pesticides available, and 20 of the most economically damaging insects were resistant to some or all of the 20 most toxic pesticides available. Expanding the use of the chemical-free methods of controlling pests and maintaining the fertility of the soil -- practices central to organic farming -- would contribute significantly to protecting our environment.

The Organic Food Alliance appreciated the opportunity to work with Senator Leahy and his staff as they were drafting S. 2108, and we believe the policy positions we developed at our recent policy conferences will be even more helpful as this and related legislation wind their way through the congressional process.

Before I articulate those positions, I want to say a word about organic farming and food production as we in the industry see it. We see ourselves providing a healthful and safe food system by producing, processing and handling foods using practices and materials that promote human health, protect the environment and sustain the production capacity of agricultural production resources. We believe that these are vitally important national goals and that the federal government has a role in helping us achieve those goals by creating nationally sanctioned organic standards, by protecting those standards through an effective certification mechanism, and by promoting the maintenance and expansion of organic farming in this country through appropriate promotion and through changes in current governmental farm programs that are detrimental to transitioning to and maintaining organic farms.

Now let me turn to the key policy positions of OFA:

1) **Participation in Defining "Organically Produced"**

OFA believes that the definition of "organically produced" is central to the advancement and regulation of organic agriculture and the organic food market. We believe all sectors of the organic industry -- including consumers -- should participate in defining "organically produced." Unlike other industries, the organic industry does not view consumers merely as sales targets, but we view them as our allies in promoting nutrition, good health, and a safe environment.

2) **Organic Materials and Practices**

OFA believes there is a need to evaluate materials and practices, and all sectors of the organic industry will participate in this process. We support the development of common standards that define acceptable materials used in producing organic food -- like fertilizers -- and acceptable production techniques, such as integrated pest management.

Implicit in our position, of course, is the understanding that the term "organic" is defined by the materials and practices used in producing and processing food and not by the absence of residues. OFA firmly believes that the bedrock of organic food production rests on sensitive, ecologically sustainable production techniques, and that the legal definition of organically produced food must reflect that.

OFA recommends adoption of the OFAC list of materials, but recognizes the urgent need for review of some materials and practices.

3) Certification

OFA considers certification to be essential to the credibility of the "organically produced" designation and supports mandatory certification and national certification standards. We support multiple approaches to certification, i.e., both government and third-party certification providing the certifiers are accredited. We recommend that the criteria for certification be developed by a representative organic industry group.

4) Transition

OFA recognizes the need for a required period of transition to organic. We accept a three-year transition period, and we recommend that growers should determine when the three-year period starts and ends.

5) Recordkeeping, Audit and Disclosure

OFA recognizes that recordkeeping is essential to certification. We recommend recordkeeping that will permit a detailed audit trail from grower through retailers and adequate disclosure requirements. In other words, we support a method for authenticating the organic product from seed to table, or conception to consumption as one of our beef-producing members puts it.

We note, however, that proprietary information must be protected in this audit process.

6) Background Contamination and Residue Testing

OFA is concerned about "background" contamination of production inputs. Currently, the level of background contamination is largely unknown. We support research to establish pre-and post-harvest standards for the purity of soil, water, and air for organic production.

We support residue testing as part of the organic certification process. We recommend a maximum detectable pesticide residue standards of 5% of current EPA tolerances. We also acknowledge the possibility that lower maximum tolerance levels may need to be established for specific chemical agents.

However, we believe strongly that the terms "pesticide-free" and "residue-free" should not be considered definitions of or synonymous with "organic."

7) Representation of the Organic Community

OFA believes representation of the organic community in the establishment of organic definitions, standards, regulations and promotion programs should include all functional sectors of the organic industry, but should not be rigidly based on geographical representation because the organic community is not uniformly distributed geographically. The various representative bodies necessary to carry out the creation and administration of the regulation of organic production should be small enough to be workable and cost-effective.

8) The Organic Food Production Act of 1990 (S.2108)

OFA endorses the broad objectives of the Leahy/DeFazio Organic Foods Production Act of 1990. We have concerns about specific areas of the bill and will work with the chairman and the committee to improve the bill.

9) Labelling of Processed Organic Foods

Food products labelled "organic" must contain only organic ingredients. Organic processing standards will include an approved materials list based on the same criteria used for "organically produced" foods. Food products that do not contain only organic ingredients according to the above criteria may use the work "organic" only in association with the organic ingredients.

Thank you for this allowing me to testify today. The Organic Food Alliance looks forward to working with this committee and all interested parties in finding workable solutions to the issues involving organic food -- solutions that work for everyone in our industry and for the American consumers who so clearly want their freedom to know and freedom to choose protected.

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MARK RETZLOFF

Mark Retzloff is President of Natural Horizons, Inc., a company formed to acquire companies in the organic and natural food production, distribution, and retailing business. He is co-founder and Chairman of the Board of Alfalfa's, Inc. (DBA Alfalfa's Market), two natural food supermarkets in Boulder and Denver, Colorado, with sales of $20 million per year.

Mr. Retzloff currently is the chairperson of the Organic Food Alliance, a legislative alliance of individuals and organizations in the organic community representing producers, manufacturers, distributors, retailers, and consumers.

He received his B.S. degree from the University of Michigan in 1970. Since 1969 has held positions in the food industry, and he organized a chain of grocery stores under the trade name "Rainbow Grocery" in several cities across the United States.

He has been president of Rocky Mountain Nutritional Foods Association, treasurer and executive board member of the Natural Foods Network, treasurer and board member of the National Institute of Nutritional Education, president of the board of the Boulder Community Food Share (food bank), and a member of the University of Colorado Artist Series board. He sits on a number of retail grocery and advertising advisory councils.

Mr. Retzloff has given presentations at trade shows, conventions, seminars, ad colleges covering a wide range of business-related topics.

In 1986, he and Alfalfa's were selected by "Progressive Grocer" as one of the top independent retailers in the United States. In October 1986, he received a certificate of recognition from the Minoru Yasui Community Volunteer Award program. In 1987 he was one of the Boulder Chamber of Commerce "Entrepreneurs to Watch." And in 1989, Mr. Retzloff was selected "Entrepreneur of Distinction" for Boulder County.

Mr. Retzloff has been involved in the organic food movement since 1970. Current projects he is working on include an organic dairy, retail expansion on the East Coast of the U.S., and other production and distribution businesses in the organic field.

Mr. Retzloff is married and has three children.

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Organic Policy Conference

SUMMARY POLICY POSITIONS

March 20, 1990

Statement of Purpose

We provide a healthful and safe food system by producing, processing and handling foods using practices and materials that promote human health, protect the environment and sustain the productive capacity of agricultural resources with certified practices according to nationally sanctioned organic standards.

1. **Participation in Defining "Organic"**

   The definition of "organic" is central to the advancement and regulation of organic agriculture and the organic food market.

   We believe that all sectors of the organic industry, including consumers, should have a role in defining "organic."

   We recommend substituting the term "organic" for "organically produced" in all situations.

2. **Organic Materials and Practices**

   We support the specification of approved and prohibited materials and practices for organic producers and handlers. All sectors of the organic industry must participate in the process of specifying permitted materials and practices. We recommend using the OFPANA Technical Committee list of materials as a foundation document and recognize the urgent need for review of these materials and practices.

   "Organic by neglect" is not a permissible production method for organically produced food, but purposeful non-intervention consistent with good stewardship should not be precluded.

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We agree to support the sustainability of all sectors of the organic food industry in the course of establishing national standards for organic food production.

3. Certification of Growers and Processors/Manufacturers

We consider certification to be essential to the credibility of the "organic" designation and support mandatory certification and national certification standards. We support multiple approaches to certification, i.e., both government and third-party certification, providing the certifiers are accredited. Retailers need not be certified but should be subject to the materials and practices restrictions in paragraph 2 and the recordkeeping practices of paragraph 6.

We recommend that the criteria for certification be developed by a representative organic industry group.

4. Transition

We recognize the need for a required period of transition to organic. We accept a three year soils transition period and a one year farmer transitional period. We recommend that growers determine when the 3 year transitional period starts and ends.

5. LISA

LISA and organic agriculture are separate and distinct, and must not be confused in regulation and in the marketplace. However, we encourage the use and expansion of low input, sustainable agriculture (LISA) production techniques

6. Recordkeeping and Disclosure

We recognize that recordkeeping is essential to certification. We support adequate recordkeeping from growers to consumer to track source of origin of product with appropriate disclosure requirements.

7. Background Contamination and Residue Testing

We are concerned about "background" contamination of production inputs. Currently, the level of background contamination is largely unknown. We support research to establish pre- and post-harvest standards for the purity of soil, water and air for organic production.

We support residue testing as a part of the organic certification process. For unintentional contamination of organic products where no prohibited pesticides have been knowingly applied by the grower or his/her agent, no processed or non processed food product should be labeled as "organic" which has pesticide residues in excess of 5 percent of current federal EPA tolerance levels, or where there is zero tolerance, 5 percent of the federal FDA action level or, for example, the current limit of quantification used by the USDA lab or other government regulated labs, whichever is higher.

We recommend that the terms "pesticide-free" and "residue-free" not be allowed to imply "organic."

8. Representation of the Organic Community

Representation of the organic community in the establishment of organic definitions, standards, regulations and promotion programs should include all functional and geographical sectors of the organic industry. The various representative bodies necessary to carry out the creation and administration and regulation of organic production should be small enough to be workable and cost-effective.

9. Promotion of Organic Products

We support the creation of industry mechanisms to facilitate and fund the promotion of organic products.

10. Self-funding of Organic Regulation

We accept that the functions necessary to regulate organic producers and promote organic production should be funded by industry fees. However, these programs must be funded and operated in a cost-effective and efficient manner. Governmental services accorded to other agricultural sectors at public expense should also be accorded the organic industry at public expense.

11. The Organic Food Production Act of 1990

We support the establishment of a national standard for organic products. Therefore we support the broad objectives of S. 2108 and H.R. 4156 although we have concerns about specific areas of these bills and will offer out recommendations accordingly.

12. Labeling or Processed Organic Foods

Processed food products labelled "organic" must be composed only of organic ingredients except for items on an acceptable materials list which is developed by a conference of organic processors and manufacturers. Food products that do not contain only organic ingredients and items on the acceptable materials list may use the word "organic" only in association with the organic ingredients.

13. **Support for Organic Research**

We recommend the earmarking of funds in appropriate federal and state budgets exclusively for research on organic issues.

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ORGANIC INDUSTRY FACT SHEET

There are approximately 7,000 operating natural food stores in the United States, representing sales of approximately $3.5 billion annually. The total selection of products carried by these stores includes fresh, bulk, packaged and frozen foods, nutritional supplements, herbal products, health and beauty aids, books and magazines. In addition, manufacturers and distributors of natural foods and related products are currently selling to traditional supermarket chains nationwide.

Organically produced foods represent about 10% of the foods on natural food store shelves. Due to increased customer demand, an ever greater number of manufacturers are using organically produced ingredients, and retailers are featuring organic foods. While organically produced foods account for only approximately 1.5% of the foods produced in the U.S. in 1989, they are projected to account for as much as 9% by the year 1999. This anticipated 1,000% increase is due to urgent market demand for organic.

In a survey by OFA Member Bread & Circus, over 75% of approximately 500 people said they purchase organic when the opportunity exists. They also claim a willingness to pay as much as a 20% premium over conventionally produced items. This claim is substantiated by the estimated sales in excess of $8 million annually at Bread & Circus alone.

PUBLIC VOICE
FOR FOOD & HEALTH POLICY

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Testimony of:

ALLEN ROSENFELD

Director of Agricultural Policy

Public Voice for Food and Health Policy

On Behalf Of:

Public Voice for Food and Health Policy

The Natural Resources Defense Council

The National Coalition Against the Misuse of Pesticides

Before:

THE SENATE COMMITTEE ON AGRICULTURE

Regarding

S. 2108

THE ORGANIC FOOD PRODUCTION ACT OF 1990

MARCH 21, 1990

Mr. Chairman, I am Allen Rosenfeld, director of agricultural policy at Public Voice for Food and Health Policy, a national research, education and advocacy organization that works for the citizen's interest in food and agriculture issues.

I want to thank the committee for giving me the opportunity to testify today on S. 2108, the "Organic Foods Production Act of 1990" on behalf of Public Voice, The Natural Resources Defense Council and The National Coalition Against the Misuse of Pesticides. Joining me at the table today is Janet Hathaway, senior project attorney at NRDC, who will be available for questions.

Let me say from the outset that our organizations commend Senator Leahy for taking leadership on the development of national legislation governing organic agriculture and organic food marketing. National legislation on organic agriculture is long-overdue and warrants the most serious consideration by Congress.

Our three organizations, as well as others, have been part of a working group of national public interest organizations that has been meeting since last December to develop constructive proposals that would encourage the expansion of organic agriculture. We have analyzed the bill from a consumer and environmental perspective and have identified ways in which the bill needs to be strengthened. My testimony today reflects the shared concerns that we have about S. 2108 and common suggestions for improving the bill.

All of us are on record in clear support of the expansion of organic agriculture, which promises important benefits in the areas of food safety, farmer and farmworker health, farm income, resource conservation and environmental quality. We believe, however, that organic agriculture will not develop rapidly without the establishment of national standards and the implementation of national labeling, certification, promotion and research programs. S. 2108 directly addresses each of these policy areas.

Our major concerns about S. 2108 have to do with the establishment, implementation and enforcement of health and environmental standards for organically produced food products. We believe that bill as it stands has a number of important shortcomings that need to be addressed not only in the interest of public health and environmental quality, but also for the sake of maintaining lasting public confidence in the organic food supply.

Without standards that the public can trust to protect health and the environment, our efforts here to promote the development of organic agriculture will likely come to naught. In our haste to facilitate the long-overdue promotion of organic agriculture, we should take care not to write legislation that will come back to haunt us. To ensure that the public remains both protected and confident we believe that substantive revisions of the bill are needed. Some of our major concerns are addressed in the discussion that follows.

ESTABLISHMENT OF STANDARDS

The bill provides for health and environmental standards in the requirements for establishing a National List of substances that are allowed in organic food production and marketing. In general the bill prohibits the use of "synthetic" substances and permits the use of "natural" products as inputs by farmers who are certified under the proposed national program. However, the bill does permit exemptions for certain synthetics from the general prohibition on synthetics and provides for the prohibition of "natural" inputs that are hazardous to health and the environment. We believe that the exemptions for specific synthetics potentially represent a gaping loophole that could undermine public confidence in the integrity of the program, and that the guidelines for prohibiting natural inputs such as botanical pesticides of toxicological concern are not adequate to protect public health and the environment.

Exemptions for Synthetics. Under the bill, the Secretary of Agriculture can approve synthetic substances that are recommended by the proposed National Organics Board only if their use would not be harmful to human health and the environment. This criterion for exempting synthetics is sufficiently vague to allow the Secretary of Agriculture to approve synthetics that pose health and environmental hazards. Experience teaches us that deciding what is unacceptably hazardous to human health is controversial and is subject not only to scientific reasoning but to political pressures as well. The bill requires the Secretary of Agriculture to make these controversial value judgments. With the Secretary of Agriculture as ultimate arbiter of the acceptability of synthetic materials, we would expect few proposed exemptions for synthetics to be rejected.

In addition, let us not forget that the Federal Food Drug and Cosmetic Act (FDCA) now limits the residue of any pesticide "to the extent necessary to protect public health." That standard, however, has not ensured a safe food supply. The organic standards being proposed in this bill seems to us to be no stricter than the federal standards that are supposed to apply to all pesticides in food. If consumers are willing to select organic food on the basis of a federal label and certification program--and even pay more for it in many instances--they should have assurances that organic food is regulated under even stronger standards and is produced in a safer and more-environmentally sensitive manner than conventionally produced foods.

Providing for the exemption of specific synthetic materials is just the beginning of process that will ultimately result in the destruction of the public image of organic foods, on which organic markets have been and will continue to be built. In the minds of consumers, "organically grown" means, without qualification, "grown without synthetics." To approve the use of synthetic materials by nationally certified organic growers would amount to misleading consumers.

Prohibiting Natural Inputs. A number of the natural materials currently used in U.S. agriculture are known to be highly toxic substances. The ultimate determination of whether a natural substance such as a botanical pesticide is too hazardous is made by the Secretary, who can prohibit a natural substance only if its use is determined by him/her to be harmful to health and the environment. Once again, we believe that the standards are sufficiently vague as to open the door to the acceptance of toxic natural substances that pose a substantial and unnecessary risk to health and the environment.

Although the bill requires the Secretary to act only on prohibition recommendations made by the proposed Organics Standards Board, the guidelines for evaluation of substances by the Organic Standards Board in Title II of the bill provide only general requirements that the Board determine the health, environmental and agronomic impacts of each substance. Given the open-endedness of these criteria, the decision about whether the health and environmental impacts are significant enough to warrant prohibition becomes a very subjective one that can easily be decided on the basis of vested economic interests. The consequence could easily be the use in organic agriculture of natural substances that are hazardous to health and the environment. In addition, such discretionary guidelines would make appeal of questionable decisions difficult, if not impossible.

To make matters worse, the bill implies that the burden lies with the Secretary to prove that natural substances proposed for the National List are hazardous to health and the environment.In matters of human health concerning known toxic substances, our starting point should be that these chemicals are harmful until proven otherwise. The burden of proof that proposed National List materials are safe should be placed on those who propose inclusion of those materials.

Vagueness of Other Requirements. Scattered throughout the bill are vague prohibitions designed to protect consumers and the environment. For example, according to Section 110 of the bill, farms cannot be certified as organic if the certification agent determines through soil tests that growing crops there is likely to result in "unsafe" residue levels in food. Nowhere in the bill, however, is an "unsafe" residue level ever defined. Similarly, the bill requires that certified producers shall not use irrigation water that has not had an analysis of "quality, salinity and purity" which has been submitted to the certifying agent for approval. Again, nowhere is there a standard for poor quality, excessive salinity, or lack of purity that can be used by the certifying agent to make a decision with public health and the environment in mind. Lastly, applications of raw manure to a crop are prohibited if they "significantly contribute to water contamination by nitrates," without any definition of what a significant contribution means. These and other vague requirements that are well-meaning but unspecified need to be defined in as much detail as possible. Otherwise, the likelihood that they will be implemented consistently and equitably is seriously compromised.

Inert Ingredients. The bill is essentially silent on the question of the regulation of natural pesticides that contain synthetic inert ingredients that act as stabilizers, dispersants, and activators for a pesticide's active ingredient. A standard should be established that requires the rapid phase-out of inert synthetic ingredients in botanical pesticide formulations in keeping with our recommendation to prohibit the use of synthetic materials by certified organic growers.

Review of Substances and Practices. Organic agriculture is an evolving system of farming practices and technologies. New inputs and practices will become available in the future and provision for their inclusion into national legislation should be made. In addition, as more information accumulates on the toxicological properties of materials often used in sustainable agriculture, it will be necessary to review our analyses of these substances in a timely manner. The bill requires only that every four years the status of materials that have been prohibited or exempted from prohibition be reviewed. We recommend that all allowable substances be expeditiously reviewed every four years.

IMPLEMENTATION OF STANDARDS

The Proposed Organic Standards Board. According to the bill, the Secretary of Agriculture would base his/her decisions on materials to be included in the National List strictly on the recommendations of the proposed Organic Standards Board. The Board, in effect, defines the universe of acceptable materials from which the Secretary is allowed to choose in determining which materials are ultimately included in the List. We find this arrangement to be highly unprecedented, unnecessary and potentially not in the best interests of consumers and the environment.

The bill requires that at least six, and as many as eight, of the fifteen members of the Board will be representatives of the organic production and marketing community. Although we respect the good intentions of that community, we feel that when hard decisions have to made about the National List, a Board with substantial organic industry membership may produce decisions which will at least appear to be motivated by self interest. As a result, the confidence of consumers may unnecessarily be placed in jeopardy.

Nowhere in federal public health and environmental regulation is an industry given so much regulatory authority over itself. This is as it should be. We feel strongly that the proposed structure for determining the National List would set a dangerous and unfortunate precedent within the food and agricultural policy process. While we applaud the efforts of the bill's authors to avoid giving the Secretary too much discretionary authority, we believe that more effective, equitable and objective mechanisms need to be developed to achieve that objective. We have no objection to the establishment of an Organic Standards Board under the proposed research and promotional order that could, along with other interested parties, make recommendations concerning the National List. However, we believe that it is not in the interests of consumers and the environment to have, as provided in the bill, the Board conduct official evaluations of proposed substances and make what amounts to the only official recommendations to the Secretary.

To avoid the problems raised by the proposed decision making structure, we recommend that an organic standards board be established that would: (1) solicit recommendations for the

National List from all interested parties; (2) commission EPA and institutions such as the National Cancer Institute to assess the health and environmental impacts of proposed materials; and (3) make the ultimate decisions about the composition of the National List. This commission should be comprised only of public health and environmental experts, including toxicologists and ecologists, with a recognized interest in organic agriculture, and representatives of recognized consumer and environmental public interest organizations that have no direct or indirect financial ties to the organic industry. To ensure that public health and environmental criteria are implemented by this board, the appointments of members of the board should come from the public-health, environmental and public interest communities themselves.

Public Disclosure. The bill does not address the importance of the consumer's right to know exactly what "organically grown" means. Although Title II provides for a "Consumer Education" order, no public information requirements have been specified. At a minimum, the bill should require that information on inputs allowable under the national organic label must be prominently displayed at all points of sale of commodities bearing the label.

Residue Testing Methods. Currently, there are no practical analytical methods for detecting food residues of a number of the more important botanical pesticides. As you know, Mr. Chairman, a major deficiency in the regulation of synthetic pesticides is the FDA's inability to detect residues of over half of the synthetic pesticides currently in use. Since we are starting with a clean slate on organics, we should make every effort to avoid repeating with natural pesticides the same mistake that has plagued our efforts to regulate synthetic pesticides. Our organizations have long been calling for the prohibition of tolerances for pesticides that can not be detected by routine FDA analytical methods. We should apply the same requirement to botanical pesticides used by certified organic farmers if we do not want to undermine our efforts to protect consumers and the environment.

Residue Testing Guidelines. Section 118 provides that the detection of a nonorganic residue (from synthetic pesticides or other synthetic material) would result in an investigation of a possible violation of the certification program. While this requirement is necessary, the bill is silent on the question of the frequency of residue testing, and provides for no authorization of a mechanism for actually conducting residue testing in the first place. These details need to specified if the residue-testing program is to be a meaningful and accountable component of the organic certification process.

In addition, the bill prohibits the use of the national organic label on any food that contains any pesticide or inorganic residue in excess of five percent of the tolerance level. As those of us who participated in the development of the bill through two drafts know, the choice of five percent of tolerance was rather an arbitrary one. In principle, we oppose any use of existing tolerances for synthetic pesticides as a criterion for determining what is fit to be labeled "organically grown." Since most tolerances lack complete health and environmental impact data, they have little relation to what might be considered an acceptable level. Besides, implicit in the consumer's expectation of organic food is the promise that what they're buying is not going to be hazardous to their health. Implementation of the five percent tolerance rule would be tantamount to breaking that promise.

At a minimum, organic growers should be held to the standards that are currently being achieved by nonorganic growers who are reducing their pesticide use and adopting IPM approaches. Many of them are producing food with residue levels considerably below five percent of tolerance even though they are applying substantial doses of synthetic pesticides. We should expect at least as much from certified organic growers who are threatened only by inadvertent residues that have accumulated in the soil or drift to their farms. Under no circumstances should any level of chemicals shown to cause cancer in laboratory animals be permitted in products carrying the national organic label.

National List Appeals Process. One way of ensuring that the standard-setting is implemented correctly is to provide for a process of appeal and review. Under Section 217 of the bill, however, a petition and review procedure is established only for individuals who are "subject to an order under this title." An appeals process should be explicitly established that allows any individual to petition the Secretary with regard to specific National List substances, either permitted or prohibited.

ENFORCEMENT OF STANDARDS

Citizen Suits. The bill provides for suits by individual citizens against violators of the organic labeling and certification programs defined in Title I. We agree with the authors of the bill that citizen suits are an essential enforcement mechanism that needs to be incorporated into a national organic labeling and certification program. According to Senate Agriculture Committee staff, however, the language in Section 117 effectively precludes citizens from suing individual farmers who are apparently in violation of the law.

We believe that the ability of farmers and nonfarmers to bring suit against all violators is an essential enforcement tool for ensuring that purchasers of certified organic products are not defrauded. The citizen suit language must explicitly provide for the ability of a private citizen acting as a private attorney general to sue any violator whether or not the violator is a grower. An appropriate model for legislative language on citizen suits can be found in the Resource Conservation and Recovery Act.

Violations by Certifying Agents. Penalties are established in the bill for certifiers who violate the bill's provisions. Certifiers found to be in violation face the loss of accreditation as a certifying agent for at least three years. We believe that the penalties for violation of the certification provisions of the bill need to be strengthened to deter certification violations. We believe that certifiers should be subject to civil penalty and/or prison terms in line with the provisions in Section 120 concerning the misuse of the organic label.

CONCLUSION

In conclusion, Mr. Chairman, I want to reiterate that our organizations are very pleased that national organic food legislation is being considered by the Agriculture Committee. This year, the Congress has an unprecedented opportunity to pass legislation that will leave farmers, consumers, and the environment all better off as a result.

We recognize and greatly appreciate the extensive effort that has gone into crafting this bill over the past year or so. While we strongly support Senator Leahy's goal of developing national organic standards that would protect human health and the environment, we feel strongly that S. 2108 needs to be strengthened in a number of crucial areas. We are deeply concerned that the vague and insufficiently protective standards in the current bill will not only further undermine the public's confidence in the food supply, but may seriously damage the reputation and future of the organic food industry. Nonetheless, we are very anxious to work closely with you, Senator Leahy and the committee to improve the bill and to see that strong legislation moves through this Congress.

COMMISSIONER
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Testimony of the Texas Department of Agriculture
JIM HIGHTOWER, COMMISSIONER

Concerning S. 2108 by Leahy et al.

Subcommittee on Agricultural Research and General Legislation
U.S. Senate Committee on Agriculture, Nutrition, and Forestry
March 22, 1990

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Thank you, Mr. Chairman.

The Texas Department of Agriculture has been a leader in establishing state-level certification and marketing programs for organic food, implementing some of the toughest standards in the nation in 1988. We strongly support the national certification program proposed in S. 2108, the Organic Food Production Act of 1990. This bill is a tremendous act of national leadership--paving the way towards a brighter future for American farmers and making sure consumers get the organic food they pay for.

I believe this bill will do for the entire United States what states like Texas, Minnesota, Washington and others have started: that is, help stimulate a diversified farm economy, provide consumers organic food options they seek and protect them from deceptive labeling, and safeguard the environment--all at the same time.

This bill will encourage farmers to diversify into new cash crops and produce for the $572-million-a-year organic-food market, the fastest growing sector in the food industry. It will guarantee the authenticity of organic food to consumers who pay that premium price, and it will help retailers respond to the increasing public demand for safe food. Since the bill requires that certified organic producers not use synthetic pesticides or fertilizers, it will also help reduce environmental damage caused by conventional agrichemicals, a goal that poll after poll shows both producers and consumers want U.S. agriculture to achieve.

In other words, the bill stakes out the common ground that unites farmers, consumers, and environmentalists. In so doing, it points the direction American farm policy must take if it is to be economically and ecologically sustainable in the 21st century.

This vision of a national farm policy is being driven by Three Cs: (1) CONCERN over the environmental effects of chemical-intensive farming; (2) the increased COST of agricultural chemicals; and (3) CONSUMERS who believe in overwhelming numbers that pesticide residues pose health risks and who are willing to pay more for food raised without synthetic chemicals.

I know the members of this committee are hearing from a lot of skeptics. We heard from them, too, when we started our program in 1987. Many retailers were skeptical about the authenticity of organic food. Today, 15 major retail chains sell TDA-certified products. Organic farmers were skeptical of government regulation. To date, we've certified 140 organic producers in Texas, helping them break into mainstream markets that they previously were unable to tap. By the end of the year, we expect to have certified 250 organic growers. The state land-grant college and Extension Service doubted the value of our program. Today, we're working side by side with key people in those systems who are helping producers change their production techniques so they, too, can become certified organic farmers.

Overcoming farmers' skepticism about the economic viability of organic farming is an ongoing task. But this task is getting easier as our list of success stories grows.

Take Jim Crawford, for example. Seven years ago, Jim realized he was losing money running a traditional farming operation. He switched to organic farming because he figured out that, with the reduced input costs and higher market prices, he would be able to stay afloat. Today, on his 900-acre farm in Muleshoe, Texas, Crawford raises organic corn, cotton, and wheat for grazing, producing significantly higher yields than his neighbors and selling corn at one-and-a-half times the market price. He is debt-free and operates his farm entirely out of cash flow.

Jim Crawford's story--which is being repeated time and time again across the country--shows how effective an environmentally sound farm program can be if it promotes grass-roots economic development and diversifies the agricultural economy. The bill before this committee today would do just that.

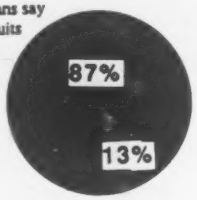
This is the approach we've successfully undertaken in Texas to help farmers and ranchers produce food that is safe for consumers and safe for the environment.

Mr. Chairman, that concludes my testimony. I'd be happy to respond to any questions the Committee might have.

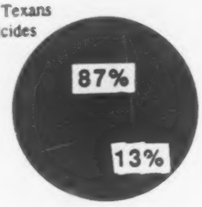
Consumers and Farmers Think Pesticide Residues Pose A Health Risk.

TEXAS POLL

■ 87% of all Texans say pesticides on fruits & vegetables present a health risk.



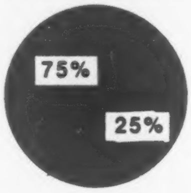
■ 87% of rural Texans also said pesticides on fruits & vegetables present a health risk.



Texas Poll, published September 1989. 1,007 Texans were polled between July 22 and August 5, 1989, by the Policy Resources Laboratory at Texas A&M University.

FOOD MARKETING INSTITUTE SURVEY

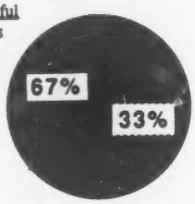
■ 75% of consumers list pesticide contamination of food as their primary concern.



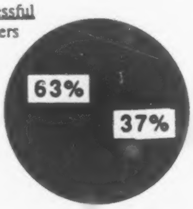
Food Marketing Institute, Washington, D.C., "Trends: Consumer Attitudes and the Supermarket," reported, May 12, 1988.

SUCCESSFUL FARMING SURVEY

■ 67% of Successful Farming readers say they are very concerned about safety of pesticides.



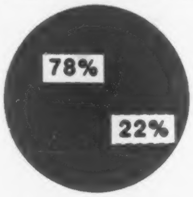
■ 63% of Successful Farming readers say their concern has increased in the past year.



Successful Farming survey of 1,200 readers, reported in Successful Farming, September 1989.

IOWA FARM AND RURAL LIFE POLL

■ 78% of Iowa farmers agree that modern farming relies too heavily on pesticides.



Iowa Farm and Rural Life Poll, published Spring 1989. 2016 Iowa farm operators were polled in February 1989, by Iowa State University Extension, Ames, Iowa.

Compiled by the TEXAS DEPARTMENT OF AGRICULTURE, December 1989.

United Fresh Fruit and
Vegetable Association

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TESTIMONY
of the
UNITED FRESH FRUIT AND VEGETABLE ASSOCIATION
before the
SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY
UNITED STATES SENATE
on
S. 2108
ORGANIC FOODS PRODUCTION ACT OF 1990
22 March 1990

Good morning Mr. Chairman and members of the Subcommittee. I am Jim Wiers, President of Wiers Farms/Dutch Maid Produce. I have been an active member of the United Fresh Fruit and Vegetable Association since February 1989 and serve on its Board of Directors. United is the national trade association for the fresh produce industry. Our 2,100 member companies include grower/shippers, brokers, wholesalers, foodservice operators, retailers and affiliated industries. Our members handle over 80 percent of the fresh produce commercially marketed in the United States.

United and its members commend Chairman Leahy for the introduction of S.2108. The Chairman, I believe, has recognized that the increasing concerns regarding pesticide residues in fresh fruits and vegetables would lead to an increase in the demand for and the availability of "organic" foods. At the same time, Senator Leahy, members of this subcommittee and the food industry were concerned that consumers would be confused without a national definition of "organic." We appreciate being included in the development of this legislation in the early stages and hope to continue working with Sen. Leahy, other members, and the staff as this bill continues to evolve.

Permit me to emphasize three points:

1. HARMONIZATION

We are very pleased that S.2108 would establish a national production standard for organically grown products. However, one of the key elements in this program is the state organic certification program. As now written the bill makes it very clear that a state organic certification program "may contain more restrictive requirements governing the organic certification of farms and handling operations..." If this is to be a national program, the certification program must be the same in each state. In fact, we believe strongly that national uniformity, or harmonization, must be a principal objective of any legislation now pending before the Congress that will impact interstate trade. Consequently we urge that this provision be revised so that states may not have a more stringent program.

2. NATIONALLY CONSISTENT LISTS OF SUBSTANCES

United strongly supports the other key element to the national production standard, a national list of approved and prohibited substances that must be adopted by all the states. It is imperative for the success of any viable organic industry that organic growers in all 50 states have the identical list of approved and prohibited substances. Although the certification program is also extremely important, the American consumers' question will be what, if any, chemical residues may be on the organic produce.

For this reason, we must oppose paragraphs (i) and (ii) under provision (1) entitled, "Exemption for Prohibited Substances," which allows the Secretary of Agriculture to add prohibited substances to the list that the Secretary determines:

(i) would not be harmful to human health or the environment;

(ii) is necessary to the production or handling of the crop because of the unavailability of wholly natural substitute products;

Our concern is that these provisions give the Secretary broad discretion to add substances to the list that may not be consistent with organic farming procedures.

The majority of our grower members use conventional chemical pratices and believe some synthetic chemicals that are prohibited by this bill may be safer than the natural substitutes. However, there should be a formal review process before chemicals described in (i) could be added to the list.

Paragraph (ii) causes us real concern and we have a problem understanding why such language appears in legislation to define "organic." To allow the addition of a chemical to the list because a "wholly natural substitute" is not available for production of a crop would virtually give the Secretary the authority to add nearly any chemical registered for use on that crop.

Also, the bill appears to contradict the very exemptions provided in paragraphs (i) and (ii) when defining the procedure for establishing the national list. This language on page 28 of the bill reads: "The National List established by the Secretary shall be based on a proposed national list or proposed amendments to the National List that is developed by the Organic Standards Board." The language continues in the next paragraph stating that: "The Secretary shall not include exemptions for the use of specific synthetic substances in the National List other than those exemptions contained in the proposed National List or proposed amendments to the National List." We interpret this language to mean that the Organic Standards Board would have to first recommend any exemptions. Although this may be all the review necessary for exemptions provided under paragraph (i), we still have concern with the exemptions allowed in paragraph (ii).

This legislation provides for an Initial Organic Standards Board that "shall establish the proposed National List or amendments to such National List". We believe some of the individuals appointed to serve on this Board should have appropriate academic credentials since they will propose the National List. For this reason we recommended that agronomists be included on the Board. We would like to take this opportunity to thank Senator Leahy and his staff for their responsiveness to our suggestion by including in the bill that at least one individual on the Board should be an agronomist. We would hope that more than one would be appointed, since their knowledge would be invaluable.

3. LOW INPUT DEMONSTRATION

United recommends that Title III--Low Input Label Demonstration Program, be deleted from the bill. We believe that such a program will only be confusing to the consumer. The definition of a transition farm as "a farm that meets all of the standards required under title I and the applicable State program but that has not yet met the 3 year requirement to be certified as an organic farm," cannot be translated in a way that will provide consumers with useful information.

This concludes my testimony. United and its members look forward to working with you to enact organic food production legislation. I will be happy to respond to any questions you might have.

TESTIMONY BY

HAROLD ALSTON

VICE PRESIDENT FOR PRODUCE SALES AND PROCUREMENT

STOP & SHOP COMPANIES, INC.

BEFORE THE

SENATE AGRICULTURE SUBCOMMITTEE

ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION

MARCH 22, 1990

I am Harold Alston, Vice President for Produce Sales and Procurement, Stop and Shop Corporation, Boston, Massachusetts. I am here today on behalf of the Stop & Shop Supermarket Company, one of the Stop & Shop Companies. We operate 117 supermarkets in Massachusetts, Connecticut, Rhode Island and Poughkeepsie, New York. We are also a member of the Food Marketing Institute and the Produce Marketing Association.

The Food Marketing Institute (FMI) is a nonprofit association conducting programs in research, education and public affairs on behalf of its 1,600 members -- food retailers and wholesalers and their customers in the United States and around the world. FMI's domestic member companies operate approximately 19,000 retail food stores with a combined annual sales volume of $180 billion -- more than half of all grocery sales in the United States. FMI's retail membership is composed of large multi-store chains, small regional firms and independent supermarkets.

The Produce Marketing Association (PMA) is a worldwide not-for-profit trade association representing companies that market fresh fruits and vegetables. PMA's membership of 2,600 ranges from supermarket retailers like myself to producers -- including organic farmers, foreign importers to U.S. restaurants and hotels. Within the U.S., PMA's members handle more than 90% of fresh produce sold. The association's objective is to promote the sale and consumption of fresh produce worldwide in a manner consistent with the public interest. I am a former director of PMA.

Mr. Chairman, I would like to submit a written statement and ask that it be made a part of the hearing record. I appreciate this opportunity to appear before you today regarding the "Organic Foods Production Act," Senate bill S. 2108. Although I cannot address all the specifics of an organic labeling and certification bill that will encourage growers to produce organic product, I am here to talk about the current food distribution system, our company's specific efforts to sell organically grown produce, and consumers' demand for the product.

The food distribution system in this country is very efficient and sophisticated. As a result, consumers spend less than 8% of their disposable income for food at home. Our industry's effective use of low-cost volume merchandising has resulted in substantial savings in the marketing of food. These savings have resulted in a higher standard of living and contribute to our country's economic growth.

According to FMI's 1989 Consumer Trends research, for the third year in a row, the number one reason why consumers shop at a certain store is because of the quality of the produce department. The produce department is very important in our stores and changes in that department do impact our ability to remain competitive.

The explosion in consumer demand for produce has been driven by nutrition and dietary concerns spurred by recurrent messages from health authorities to eat more of these items. This market demand has been fueled by the increased availability of items that taste good, are reasonably free of defects, blemishes and insect infestations, look good and are affordable. Worldwide sourcing, new varieties, improved crop protection techniques, better transportation and distribution systems, have all combined to satisfy a demand that shows little sign of slowing.

I believe it is fair to say that my company is acknowledged as a leader in marketing organically grown fresh produce to consumers. We have shared our expertise with non-competing retailers in outer parts of the country. In fact, last year I spoke on marketing organics to a standing-room only audience at the PMA convention. So I can speak with some authority about the challenges facing most retailers in marketing organics.

The major challenges in marketing organically grown produce at the retail level today are:

o there are no uniform national standards. This bill makes progress toward a single, uniform standard to ensure that produce marketed as organic actually is what it says. Without uniform national standards, we will cause a nightmare for consumers who will be confused about differing state standards. Without national uniform standards you will not see a major expansion of organic products into the larger chains. This is because different states making different definitions of what is organic discourages any wholesale or retail grocer that operates in more than one state from marketing the product. It is essential that national uniformity means just that: no more, no less. The market wants the reassurance that all producers are being held to a single, high standard that is recognizable and enforceable nationwide. The absence of a single national standard for organic produce will be a major obstacle to greater market penetration.

Most consumers think that when they see the word organic absolutely no pesticides or other chemicals have been used at any stage of production: that is not necessarily true. All organic claims should be verifiable on the basis of good science and full disclosure of chemical and non-chemical controls should be adopted.

o there is no federal verification available that the organic sign above a product means it is really organic. It is very important that the federal government set and maintain a national inspection system that is free of any conflict of interest and is not controlled or dominated by growers or brokers.

All standards must be realistic and enforceable. The bill's proposed across-the-board five percent rule that allows synthetic pesticide residues up to five percent of EPA allowable levels is potentially false and misleading because it is unenforceable. Approximately 80 percent of the pesticides registered for use in the U.S. cannot be routinely tested to low enough levels in food to enforce the five percent rule. Therefore, we recommend that a verifiable standard of "No Detected Residues" be adopted in place of the five percent rule.

o There is insufficient variety and inconsistent supply. Unrealistic expectations from some suppliers and distributors often cause retailers to carry the increased product line only when price, quality and supply allow. We simply cannot operate modern supermarkets without the assurance of fully adequate supplies.

o The market for organically grown produce is currently very small. Last year it represented about one half of one percent of all produce sales at Stop & Shop. When Alar was front page news, we experienced a temporary increase in organic sales, but they have leveled off.

o organic growers' promotional activities need to be established nationwide. Promotion of organic products will have to come from suppliers and distributors. I've read many comments by people who believe that supermarket chains aren't doing enough to promote these products. Unfortunately, these comments throw light only on their misunderstanding of how food products move through the supermarket, especially the produce aisles. It took about twenty years from its introduction for the former chinese gooseberry to become the modern day kiwifruit in the 1980s. It took expanded production and promotional dollars from producers in California and New Zealand to educate consumers and convince retailers that valuable shelf space would generate a return on their investment.

The same investment of promotional funds will have to support marketing of organic agriculture products if they are ever to take a substantial role in the produce aisle of the future. As production increases, there must be a simultaneous promotional effort to educate and interest consumers. Supermarkets that operate on the average razor-thin return on sales cannot promote one product over another. Supermarkets today sell an average of over 26,000 items. You can easily see that retailers cannot be expected to fund this promotion of all 26,000 items in a grocery store. Those in the organic agriculture community need to realize this and develop their marketing strategies accordingly. To build retail buyer demand, you must create consumer demand. This requires promotional dollars.

o distribution must be nationwide. Some organic suppliers and distributor are more accustomed to dealing with smaller natural/health food stores whose owners are emotionally committed to their cause. To develop a presence in the very different supermarket environment, these same players will have to learn how the supermarket chains operate and develop their plans accordingly.

o product identification for cashiers at the checkout stand needs to be improved. Identifying the product so it is properly priced at the checkout remains a major challenge to store operators. This may seem trivial, but I can tell you from personal experience that product identification at the checkout remains one of the principal impediments to marketing even some of the conventionally grown produce varieties. For example, it is the reason you often see several different varieties of apples or plums, all of similar color, sold for the same price. They do not cost the store the same, but to avoid costly errors, the supermarket prices them a. one level.

Now, take organics: you have a product that may look exactly the same as the conventionally grown product alongside. First, you have to be sure that your produce clerks keep the two products separated in the display. You must devise a way to ensure they are marked accurately and priced accordingly at the checkout. If all produce were packaged this would be easy. But, as you know, consumers have driven our industry to supply most produce in bulk. Shoppers want to choose.

Most retailers therefore opt to display organic products in a separate section to ensure no commingling of conventional and organic items. And, to ensure accurate ring-up, they package their organics. This creates a disincentive. Studies show that packaged products in the produce aisle do not generate the same shopper response as a large bulk display.

I believe that market differentiation is a force that must play a major role in expanding sales of sustainable agricultural products. Stores with a shopper base that will support the costlier product through regular purchases — for whatever reason they choose — will position themselves accordingly in the marketplace. Some specialized, smaller retail chains and independents have already done this. They have chosen organics to create their market image in produce. The large chains have more of a problem: there are several operational barriers already mentioned that act as disincentives to these companies. These must be solved.

Thank you for this opportunity to testify before your committee today. I'll be delighted to answer any questions you or other committee members might have at this time.

II

101st CONGRESS
2d Session

S. 2108

To promote the production of organically produced foods through the establishment of a national standard production for organically produced products and providing for the labeling of organically produced products, and for other purposes.

IN THE SENATE OF THE UNITED STATES

February 8 (legislative day, January 23), 1990

Mr. Leahy (for himself, Mr. Cranston, Mr. Heflin, Mr. Bentsen, Mr. Wilson, Mr. Daschle, Mr. Conrad, Mr. Packwood, Mr. Harkin, Mr. Pryor, Mr. Kerrey, Mr. Boren, Mr. Shelby, Mr. Bumpers, Mr. Kohl, Mr. Lieberman, Mr. Baucus, Mr. Kennedy, and Mr. Kerry) introduced the following bill; which was read twice and referred to the Committee on Agriculture, Nutrition, and Forestry

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A BILL

To promote the production of organically produced foods through the establishment of a national standard production for organically produced products and providing for the labeling of organically produced products, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Organic Foods Production Act of 1990".

SEC. 2. TABLE OF CONTENTS.

The table of contents is as follows:

Sec. 1. Short title.
Sec. 2. Table of contents.
Sec. 3. Findings and purposes.

TITLE I—NATIONAL STANDARDS GOVERNING THE ORGANIC PRODUCTION OF AGRICULTURAL PRODUCTS

Sec. 101. Definitions.
Sec. 102. National organic production program.
Sec. 103. Establishment of label.
Sec. 104. General requirements.
Sec. 105. State organic certification program.
Sec. 106. Accreditation program.
Sec. 107. Requirements of certifying agents.
Sec. 108. Inspectors.
Sec. 109. Peer review of certifying agents.
Sec. 110. National standards for organic production.
Sec. 111. National list.
Sec. 112. Prohibited crop production practices and materials.
Sec. 113. Contents of organic farm plan.
Sec. 114. Animal production practices and materials.
Sec. 115. Post-harvest handling.
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Sec. 119. Other production and handling practices.
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TITLE II—NATIONAL BOARDS

Sec. 201. Definitions.
Sec. 202. National organic promotion program.
Sec. 203. Issuance of orders.
Sec. 204. Required terms of orders.
Sec. 205. Initial national organic delegate body.
Sec. 206. Duties of the delegate body.
Sec. 207. Initial national organic board.
Sec. 208. Initial organic standards board.
Sec. 209. Referendum.
Sec. 210. Establishment of national organic assembly.
Sec. 211. Duties of national organic assembly.
Sec. 212. National organic board.
Sec. 213. Assessments.
Sec. 214. Organic standards board.
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TITLE III—LOW INPUT LABEL DEMONSTRATION PROGRAM

Sec. 301. Definitions.
Sec. 302. National label demonstration program.
Sec. 303. Administration.
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TITLE IV—NATIONAL LABORATORY ACCREDITATION

Sec. 401. Purposes.
Sec. 402. Definitions.
Sec. 403. National laboratory accreditation program.
Sec. 404. Accreditation.
Sec. 405. Samples.
Sec. 406. Application.
Sec. 407. Reporting.
Sec. 408. Fees.
Sec. 409. Public disclosure.
Sec. 410. Regulations.
Sec. 411. Authorization of appropriations.
Sec. 412. Effective date.

SEC. 3. FINDINGS AND PURPOSES.

(a) FINDINGS.—Congress finds that—

(1) consumers are demanding fresh and processed foods produced using organic methods;

(2) organic farming methods promote more sustainable agricultural practices than traditional farming methods using high levels of chemicals;

(3) existing rules that govern the labeling of fresh and processed food do not provide national standards for food production;

(4) while some regional variation is necessary and desirable, current State and private organizations have such differing organic definitions, standards, and certifi-

cation procedures that interstate commerce is hampered; and

(5) there is a need for a national program designed to standardize and promote the production of food through organic and sustainable farming methods.

(b) PURPOSES.—It is the purpose of this Act—

(1) to establish national standards governing the labeling of certain agricultural products as organically produced products;

(2) to provide consumers with reliable information concerning which products are organically produced;

(3) to assure consumers that products labeled as organically produced are not produced with, or handled with, compounds that cause adverse human health or environmental effects;

(4) to encourage environmental stewardship through the increased adoption of organic and sustainable farming methods;

(5) to assist emerging and important food industry sectors that produce, process, and market organically produced products;

(6) to provide market incentives to encourage the use of organic and sustainable farming practices;

(7) to preserve the integrity of organic food programs that have been implemented by States and encourage other States to adopt organic food programs;

(8) to facilitate interstate commerce in fresh and processed food that is organically produced; and

(9) to establish accreditation procedures for laboratories that provide certain chemical residue testing services.

TITLE I—NATIONAL STANDARDS GOVERNING THE ORGANIC PRODUCTION OF AGRICULTURAL PRODUCTS

SEC. 101. DEFINITIONS.

As used in this title:

(1) AGRICULTURAL PRODUCTS.—The term "agricultural products" means any agricultural commodity or product, whether raw or processed, including any commodity or product derived from livestock, or fowl that is marketed in the United States for human and livestock consumption.

(2) CERTIFYING AGENT.—The term "certifying agent" means the chief executive officer of a State or, in a State that provides for the Statewide election of a Commissioner of Agriculture, the Commissioner of Agriculture, or an individual (including private entities)

who is accredited by the Secretary as a certifying agent for the purpose of certifying a farm or handling operation as an organically certified farm or handling operation in accordance with this title.

(3) CERTIFIED ORGANIC FARM.—The term "certified organic farm" means a farm, or portion of a farm, that is certified by the certifying agent under this title as utilizing a system of organic farming as described by this title.

(4) CERTIFIED ORGANIC HANDLING OPERATION.—The term "certified organic handling operation" means any operation, or portion of any handling operation, that is certified by the certifying agent under this title as utilizing a system of organic handling as described under this title.

(5) CROP YEAR.—The term "crop year" means the normal growing season for a crop as determined by the Secretary.

(6) GOVERNING STATE OFFICIAL.—The term "governing State official" means the chief executive official of a State or, in a State that provides for the Statewide election of a Commissioner of Agriculture, the Commissioner of Agriculture, who administers the organic certification program established under section 102(a) and approved by the Secretary.

(7) GROWING MEDIUM.—The term "growing medium" means a substance that provides nutrients for plants or fungi but that is separate from the land surface.

(8) HANDLE.—The term "handle" means to sell, process, or package organically produced agricultural products.

(9) HANDLER.—The term "handler" means any individual engaged in the business of handling agricultural products.

(10) HANDLING OPERATION.—The term "handling operation" means any operation or portion of an operation that—

(A) receives or otherwise acquires agricultural products from the producer of such products; and

(B) processes, packages, or stores such products.

(11) INDIVIDUAL.—The term "individual" means a person, group of people, corporation, association, organization, cooperative, or other entity.

(12) MICRONUTRIENTS.—The term "micronutrients" means trace or minor elements in the soil that are essential for normal plant growth.

(13) NATIONAL LIST.—The term "National List" means a list of approved and prohibited substances as provided for in section 111.

(14) ORGANIC FARM PLAN.—The term "organic farm plan" means a plan of management of an organic farm that has been agreed to by the producer and the certifying agent and that includes written plans concerning all aspects of agricultural production described in this title including crop rotation and other practices as required under section 107.

(15) ORGANICALLY PRODUCED.—The term "organically produced" means an agriculture product that is produced using organic farming methods as described in this title, on an organically certified farm and handled by organically certified handling operations.

(16) ORGANICALLY PRODUCED LABEL.—The term "organically produced label" means a label that is established under section 103.

(17) PESTICIDE.—The term "pesticide" means any substance which alone, in chemical combination, or in any formulation with one or more substances, is defined as a pesticide in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.).

(18) PROCESSING.—The term "processing" means cooking, baking, heating, drying, mixing, grind-

ing, churning, separating, extracting, cutting, fermenting, eviscerating, preserving, dehydrating, freezing, or otherwise manufacturing, and includes the packaging, canning, jarring, or otherwise enclosing food in a container.

(19) PRODUCER.—The term "producer" means an individual who engages in the business of growing or producing food for consumption by humans or livestock.

(20) SECRETARY.—The term "Secretary" means the Secretary of Agriculture.

(21) STATE ORGANIC CERTIFICATION PROGRAM.—The term "State organic certification program" means a program that meets the requirements of section 104, is approved by the Secretary, and that is designed to ensure that a product that is labeled as "organically produced" under this title is produced and handled using organic methods.

(22) SYNTHETIC.—The term "synthetic" means a substance that is formulated or manufactured by a process which chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, excepting microbiological processes.

SEC. 102. NATIONAL ORGANIC PRODUCTION PROGRAM.

(a) IN GENERAL.—The Secretary shall establish an organic certification program for producers and handlers of agricultural products that have been produced using organic methods as provided for in this title.

(b) STATE PROGRAM.—In establishing the program under subsection (a), the Secretary shall permit each State to implement a State organic certification program for producers and handlers of agricultural products that have been produced using organic methods as provided for in this title.

(c) CONSULTATION.—In developing the program under subsection (a), and the National List under section 111, the Secretary shall consult with any Organic Standards Board or Initial Organic Standards Board established under title II.

(d) LABELING.—Each certifying agent may label agricultural products that have been produced on organically certified farms and handled through certified handling operations as "organically produced".

(e) CERTIFICATION.--Each certifying agent may certify a farm or handling operation that meets the requirements of this title and the requirements of the organic certification program of the State (if applicable) as an organically certified farm or handling operation.

SEC. 103. ESTABLISHMENT OF LABEL.

(a) IN GENERAL.—The Secretary shall establish a label to be affixed to agricultural products that have been produced on organically certified farms and have been handled by organically certified handlers.

(b) CONTENT OF LABEL.—The label established under subsection (a) shall state that the agricultural product to which such label is affixed has been "organically produced" and shall bear the seal of the Department of Agriculture.

(c) AFFIXING LABEL.—

(1) REQUIREMENT.—The Secretary or certifying agent may affix such label only on an agricultural product that has been produced and handled in accordance with this title and the organic certification program of the State (if applicable) that is implemented in accordance with this title.

(2) AFFIXATION.—The Secretary or the certifying agent shall have the exclusive authority to affix such label to an agricultural product.

(d) TAMPERING WITH LABEL.—No individual may replicate, affix, or otherwise tamper with an organically produced label in any manner other than a normal consumer use, as determined by the Secretary.

(e) LIMITATION ON LABELING.—

(1) RESTRICTION.—On or after September 1, 1992, no individual may affix a label to an agricultural product that implies, directly or indirectly, that such product is organically, naturally, or ecologically pro-

duced, grown, processed, or marketed, except in accordance with this title and under an approved State organic certification program implemented under this title.

(2) EXEMPTION.—Paragraph (1) shall not apply to individuals who sell agricultural products at local farmers markets if compensation for the sale of such products does not exceed $1,000 annually.

(3) EXEMPTION FOR IMPORTED PRODUCTS.—Paragraph (1) shall not apply to imported agricultural products with labels that imply that such product is organically or naturally produced if the Secretary determines that such products have been produced and handled under an organic program that provides safeguards and guidelines governing the production and handling of such products that are at least equivalent to the requirements of this Act.

(f) STATE LABEL.—The certifying agent, on the approval of the Secretary, may affix an additional label to an agricultural product that indicates the State origin and certifying body of such product.

SEC. 104. GENERAL REQUIREMENTS.

(a) IN GENERAL.—A program established under this title shall—

(1) require that each agricultural product that bears an organically produced label must—

(A) be produced only on organically certified farms and handled only through organically certified handling operations in accordance with this title; and

(B) be produced and handled in accordance with such program;

(2) require that producers desiring to participate under such program establish an organic farm plan under section 113;

(3) establish procedures that permit producers and handlers to appeal an adverse administrative determination under this title;

(4) require that each organic farming operation or each organic handling operation covered under such program certify to the Secretary, the governing State official (if applicable), and the certifying agent on an annual basis, that such producer or handler has not produced or handled any agricultural product bearing an organically produced label except in accordance with this title and any applicable State program;

(5) require annual on-site inspections of each farm and handling operation that has been certified under this title;

(6) require periodic residue testing of agricultural products that have been produced on organically certified farms and handled through organically certified handling operations to determine whether such products contain any pesticide or other nonorganic residue or natural toxicants;

(7) establish appropriate and adequate enforcement procedures, as determined by the Secretary to be necessary and consistent with section 120;

(8) establish regulations to protect against conflict-of-interest as specified under section 107(i);

(9) require public access to certification documents and laboratory analyses that support certifications under this title; and

(10) require such other terms and conditions as may be determined by the Secretary to be necessary.

(b) DISCRETIONARY REQUIREMENTS.—An organic certification program established under this title may—

(1) provide for the collection of reasonable fees from producers and handlers who participate in such program; and

(2) provide for the certification of an entire farm or handling operation or specific fields of a farm or parts of a handling operation if—

(A) in the case of a farm, the fields to be certified have distinct, defined boundaries and buffer zones separating the land being operated through the use of organic methods from land that is not being operated through the use of such methods;

(B) in the case of a handling operation, the part of a handling operation to be certified under this title is adequately separated, as determined by the certifying agent, from other parts of the handling operation that are not organically managed;

(C) the operators of such farm or handling operation maintain separate records of all operations and make such records available at all times for inspection by the Secretary, the certifying agent, and the governing State official; and

(D) appropriate physical facilities, machinery, and management practices are established to prevent the possibility of a mixing of organic and nonorganic products or a penetration of prohibited chemicals or other substances on the certified land or area.

(c) STATE PROGRAM.—A State organic certification program approved under this title may contain additional guidelines governing the production or handling of products labeled as organically produced in such State as required in section 105.

SEC. 105. STATE ORGANIC CERTIFICATION PROGRAM.

(a) IN GENERAL.—A State may establish a State organic certification program that meets the requirements of this title.

(b) ADDITIONAL REQUIREMENTS.—

(1) AUTHORITY.—A State organic certification program established under subsection (a) may contain more restrictive requirements governing the organic certification of farms and handling operations and the production and handling of agricultural products that are to be labeled as organically produced under this title than are contained in the program established by the Secretary.

(2) CONTENT.—Additional requirements established under paragraph (1) shall—

(A) further the purposes of this title;

(B) not be inconsistent with this title;

(C) not be discriminatory towards agricultural commodities produced in other States that are certified under this title; and

(D) be approved by the Secretary.

(c) SUBMISSION TO THE SECRETARY.—

(1) INITIAL PLAN.—The governing State official shall prepare and submit, to the Secretary, a plan for the establishment of a State organic certification program, and the Secretary shall approve or disapprove of such plan.

(2) SUBSEQUENT REVIEW.—The Secretary shall review programs established under plans approved under paragraph (1) not less than once during each 5-year period following the date of the approval of such program under paragraph (1).

(3) CHANGES IN PROGRAM.—The governing State official, prior to implementing any substantive change to programs approved under paragraph (1), shall submit such change to the Secretary for approval.

(4) TIME FOR DETERMINATION.—The Secretary shall make a determination concerning any plan, proposed change to a plan, or a review of a plan not later than 6 months after receipt of such plan, such proposed change, or the initiation of such review.

SEC. 106. ACCREDITATION PROGRAM.

(a) IN GENERAL.—The Secretary shall establish and implement a program to provide a governing State official or a private individual that meets the requirements of this section, with an accreditation as a certifying agent for the purpose of certifying a farm or handling operation as an organically certified farm or handling operation.

(b) REQUIREMENTS.—To be accredited as a certifying agent under this section, a governing State official or private individual shall—

(1) prepare and submit, to the Secretary, an application for such accreditation;

(2) have sufficient expertise in organic farming and handling techniques; and

(3) comply with the requirements of this title.

(c) DURATION OF DESIGNATION.—An accreditation made under this section shall be for a period of not to exceed 4 years, or a shorter period, as determined appropriate by the Secretary.

SEC. 107. REQUIREMENTS OF CERTIFYING AGENTS.

(a) ABILITY TO IMPLEMENT REQUIREMENTS.—To be accredited as a certifying agent under section 106, a governing State official or an individual must be able to fully implement the organic labeling program established under this title.

(b) USE OF ORGANICALLY PRODUCED LABEL.—A certifying agent shall use the organically produced label only in accordance with this title and the State organic certification program (if applicable).

(c) INSPECTORS.—A certifying agent shall employ a sufficient number of inspectors as necessary to implement the program established under this title, as determined appropriate by the Secretary.

(d) RECORDKEEPING.—

(1) MAINTENANCE OF RECORDS.—A certifying agent shall maintain all records concerning the activities of such agent under this title for a period of not less than 10 years.

(2) ACCESS FOR SECRETARY.—A certifying agent shall permit representatives of the Secretary and the governing State official to have access to any and all records concerning the activities of such agent under this title.

(3) TRANSFERENCE OF RECORDS.—If a private individual that has been accredited as a certified agent under section 106 is dissolved or loses its accreditation, all records concerning activities of such individual under this title shall become the property of the Secretary and shall be transferred to the Secretary.

(e) AGREEMENT.—A certifying agent shall enter into an agreement with the Secretary under which, such agent shall—

(1) agree to carry out this title;

(2) agree to such other terms and conditions as the Secretary determines appropriate; and

(3) agree to arrange for and submit, annually to the Secretary, the results of an independent audit of the operations and activities of such agent under this title.

(f) PRIVATE CERTIFYING AGENT AGREEMENT.—A private individual that has been accredited as a certifying agent under section 106, in addition to the agreement required under subsection (e), shall—

(1) agree to hold the Secretary harmless for any failure on the part of the agent to carry out this title; and

(2) furnish reasonable security, in an amount determined by the Secretary, for the purpose of protecting the rights of participants in the program established under this title and to hold the Secretary harmless for any failure on the part of such agent to carry out this title.

(g) COMPLIANCE WITH STATE PROGRAM.—A certifying agent shall fully comply with the terms and conditions of the applicable State organic certification program implemented under this title.

(h) CONFIDENTIALITY.—Except as provided in section 104(a)(9), a certifying agent shall maintain strict confidentiality, with respect to the clients of such agent, and shall not disclose to third parties (with the exception of the Secretary or the applicable governing State official) any business related information concerning such client that was obtained while the agent was implementing this title.

(i) CONFLICT OF INTEREST.—A certifying agent shall not—

(1) carry out any inspections of any operation in which such agent, or employee of such agent has, or has had, a commercial interest in, including the provision of consultancy services by such agent;

(2) accept payment, gifts, or favors of any kind from the business inspected that is in excess of prescribed fees; or

(3) provide advice concerning organic practices or techniques for a fee, other than for fees established under such program.

(j) ADMINISTRATOR.—A certifying agent that is a private individual shall designate the person who controls the day to day operations of the agent and who shall be responsible for all matters in connection with the activities of the agent under this title.

(k) SALE OF NON-ORGANIC PRODUCTS.—A certifying agent shall not permit any individual certified by such agent under this title to deliver or sell any agricultural commodities labeled as organically produced under this title if such commodities do not meet the requirements of this title.

(l) LOSS OF ACCREDITATION.—

(1) NONCOMPLIANCE.—If the Secretary or the governing State official (if applicable) determines that a certifying agent is not in compliance with this title, the Secretary or such governing State official may suspend the accredidation of such agent.

(2) EFFECT ON CERTIFIED OPERATIONS.—If the accredidation of a certifying agent is suspended under paragraph (1), the Secretary or the governing State official (if applicable) shall promptly determine whether farming or handling operations certified by such agent may retain their organic certification.

SEC. 108. INSPECTORS.

(a) NUMBER.—A certifying agent shall employ a sufficient number of inspectors that have knowledge of organic farming or organic handling operations to carry out this title, as determined appropriate by the Secretary and the governing State official (if applicable).

(b) FARMING OPERATIONS.—Inspectors employed by the certifying agent under subsection (1) to inspect organic farming operations shall be qualified to perform such inspections based on the education and training of such inspectors, as determined appropriate by the Secretary and the governing State official (if applicable). Such inspectors should have a minimum of 5 years experience in organic farming or organic production.

(c) HANDLING OPERATIONS.—Inspectors employed by the certifying agent under subsection (1) to inspect organic handling operations shall be qualified to perform such inspection based on the education and training of such inspectors, as determined appropriate by the Secretary and the governing State official (if applicable). Such inspectors should have a minimum of 5 years experience in the organic production of food or in appropriate food industry experience.

(d) LIST OF INSPECTORS.—A certifying agent shall maintain a list of all inspectors employed by such agent and shall furnish such list to the Secretary and the governing State official (if applicable) annually.

SEC. 109. PEER REVIEW OF CERTIFYING AGENTS.

(a) PEER REVIEW.—In determining whether to approve an application for accreditation submitted under section 106, the Secretary shall consider a report concerning such applicant that shall be prepared by a peer review panel established under subsection (b).

(b) PEER REVIEW PANEL.—To assist the Secretary in evaluating applications under section 106, the Secretary shall establish a panel of not less than three persons who have expertise in organic farming and handling methods, to evaluate the State or private individual that is seeking accredidation as a certifying agent under such section. Not less than two members of such panel shall be individuals who are not employees of the Department of Agriculture or of the applicable State government.

SEC. 110. NATIONAL STANDARDS FOR ORGANIC PRODUCTION.

(a) ORGANICALLY PRODUCED PRODUCTS.—To be labeled as an organically produced agricultural commodity under this title, such commodity shall meet the minimum standards established under this section.

(b) PROHIBITED PRACTICES.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall not have been produced through the use of any production practices that are prohibited under this title during the greater of 3 crop years or 3 calendar years prior to the crop year during which such agricultural product is produced.

(c) HANDLING.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall be handled in accordance with this title and the applicable State organic certification program.

(d) SYNTHETIC CHEMICALS.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall have been produced—

(1) without the use of synthetic chemicals; and

(2) on land that has not had synthetic chemicals applied during the greater of 3 crop years or 3 calendar years prior to the crop year during which such product is produced.

(e) SOIL QUALITY.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall not have been produced on soil or in any growing medium that has been determined by the certifying agent (after appropriate soil testing) to contain levels of chemical residue that are likely to result in unsafe residue levels in any food produced on such soil.

(f) SOIL BUILDING.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall have been produced using practices that replenish and maintain soil fertility by providing optimal conditions for soil biological activity.

(g) COMPLIANCE WITH ORGANIC FARM PLAN.—To be labeled as an organically produced agricultural product under this title, an agricultural commodity shall be produced in compliance with an organic farm plan agreed to by the producer of such product and the governing State official (if applicable).

SEC. 111. NATIONAL LIST.

(a) IN GENERAL.—The Secretary shall establish a National List of approved and prohibited substances that shall be included in the standards for organic production established under this title in order for such products to be labeled as organically produced under this title.

(b) CONTENT OF LIST.—

(1) ITEMIZATION OF SUBSTANCES.—The List established under subsection (a) shall contain an itemization of—

(A) the specific synthetic substances that may be used in the production and handling of agricultural products labeled as organically produced under this title, even though the use of such substances is prohibited elsewhere in this title; or

(B) the specific natural substances that may not be used in the production and handling of agricultural products labeled as organically produced under this title, even though the use of such substances would be allowed under other provisions of this title.

(2) SPECIFIC USES.—An exemption granted under paragraph (1)(A) or the prohibition contained in paragraph (1)(B) with respect to a specific synthetic or natural substance shall be limited to a specific use of such substance in a farming or handling operation.

(c) GUIDELINES FOR PROHIBITIONS OR EXEMPTIONS.—

(1) EXEMPTION FOR PROHIBITED SUBSTANCES.—The National List may provide for the use of substances in an organic farming or handling operation that are otherwise prohibited under this title only if—

(A) the Secretary determines that the use of such substances—

(i) would not be harmful to human health or the environment;

(ii) is necessary to the production or handling of the crop because of the unavailability of wholly natural substitute products; and

(iii) is consistent with organic farming procedures; and

(B) the specific exemption is developed using the procedures described in subsection (d).

(2) PROHIBITION OF USE OF SPECIFIC NATURAL SUBSTANCES.—The National List may provide for the prohibition of the use of specific natural substances in an organic farming or handling operation that are otherwise permitted under this title only if—

(A) the Secretary determines that the use of such substances—

(i) would be harmful to human health or the environment; and

(ii) is inconsistent with organic farming procedures and the purposes of this title; and

(B) the specific prohibition is developed using the procedures described in subsection (d).

(d) PROCEDURE FOR ESTABLISHING NATIONAL LIST.—

(1) IN GENERAL.—The National List established by the Secretary shall be based on a proposed national list or proposed amendments to the National List that is developed by the Organic Standards Board (or the Initial Organic Standards Board, as applicable).

(2) NO ADDITIONS.—The Secretary shall not include exemptions for the use of specific synthetic substances in the National List other than those exemptions contained in the proposed national list or proposed amendments to the National List.

(3) NOTICE AND COMMENT.—Prior to establishing the National List or making amendments to such, the Secretary shall provide for the publishing of the proposed national list or any proposed amendments to the National List in the Federal Register and seek public comment on such proposals. The Secretary shall include in such publication any changes to such pro-

posed list or amendments recommended by the Secretary.

(4) PUBLICATION OF NATIONAL LIST.—After evaluating all comments received concerning the proposed national list or proposed amendments to the National List, the Secretary shall publish the final National List in the Federal Register, together with a discussion of comments received.

(e) SUNSET PROVISION.—No exemption or prohibition contained in the National List shall be valid unless the National Organic Board has reviewed such exemption or prohibition as required under title II within 5 years of such exemption or prohibition being adopted.

SEC. 112. PROHIBITED CROP PRODUCTION PRACTICES AND MATERIALS.

(a) SEED, SEEDLINGS AND PLANTING PRACTICES.—

(1) PROHIBITED PRACTICES.—For a farm to be certified under this title, producers on such farm shall not—

(A) use synthetic pesticides or soil fumigants in any seedlings or plant materials produced on such farm for organic production;

(B) except as provided in paragraph (2), use synthetic-pesticide-treated-seeds; or

(C) apply materials to, or engage in practices on, seeds or seedlings that are determined by the Secretary or by the applicable governing State official to be contrary to, or inconsistent with, this title or the applicable State organic certification program.

(2) SYNTHETIC-PESTICIDE-TREATED-SEED.—A producer may use specific synthetic-pesticide-treated-seed on such farm under paragraph (1) prior to January 1, 1995, if such specific use is authorized under the applicable State organic certification program.

(b) IRRIGATION WATER.—For a farm to be certified under this title, producers on such farm shall not use irrigation water for the production of agricultural products unless such water has been analyzed for quality, salinity, and purity and such analysis has been submitted for the approval of the certifying agent.

(c) SOIL AMENDMENTS.—For a farm to be certified under this title, producers on such farm shall not—

(1) use any fertilizers containing synthetic ingredients or any commercially blended fertilizers containing materials prohibited under this title or under the applicable State organic certification program;

(2) use as a source of nitrogen—

(A) anhydrous ammonia;

(B) ammonium nitrate;

(C) contaminated organic materials; or

(D) mixed synthetic sources of soluble nitrates at high concentrations for the sole purpose of increasing production;

(3) use as a source of phosphorus—

(A) ordinary or triple superphosphate; or

(B) any excessively soluble material, acidifying material, or both, with a high salt index;

(4) use quicklime or slaked or hydrated lime applied to the soil as a source of calcium;

(5) use as a source of micronutrients—

(A) chemically fortified liquid; or

(B) excessive doses of any micronutrient, as determined by the certifying agent; and

(6) use any synthetic growth promoters or synthetic growth regulators.

(d) CROP MANAGEMENT.—

(1) PEST CONTROL.—For a farm to be certified under this title, producers on such farm shall not—

(A) use synthetic pesticides;

(B) use traps containing prohibited pesticides, unless authorized in writing by the applicable governing State official with the approval of the Secretary; and

(C) use natural poisons such as arsenic or lead salts that have long-term effects and persist in the environment, as determined by the applicable governing State official or the Secretary.

(2) WEED CONTROL.—For a farm to be certified under this title, producers on such farm shall not—

(A) use synthetic or petroleum-distillate pesticides;

(B) use synthetic growth regulators;

(C) use micronutrients at toxic levels to kill weeds in crops that tolerate excess micronutrients, such as boron in beet production, as determined by the applicable governing State official or the Secretary; or

(D) use plastic mulches, unless such mulches are removed at the end of each growing or harvest season.

(3) DISEASE CONTROL.—For a farm to be certified under this title, producers on such farm shall not use synthetic fungicides, fumigants, synthetic sterilizing agents, or synthetic bactericidal agents for the purpose of controlling diseases.

SEC. 113. CONTENTS OF ORGANIC FARM PLAN.

(a) IN GENERAL.—A producer seeking certification under this title shall submit an organic farm plan to the certifying agent that meets the requirements of this title and the State organic certification program (if applicable), and such plan shall be reviewed by the certifying agent who shall determine if such plan meets the requirements of such programs.

(b) SOIL FERTILITY.—An organic farm plan shall contain provisions designed to foster soil fertility, primarily through the management of the organic content of the soil through proper tillage, crop rotation, and manuring.

(c) CROP ROTATION.—An organic farm plan shall require producers to rotate, according to an established crop rotation plan, each crop, except—

(1) perennial crops;

(2) crops included in a permaculture system;

(3) crops grown in a container or other growing medium; or

(4) crops grown on a non-rotating basis in accordance with regional organic practices, as determined by the applicable governing State official or the Secretary.

(d) CROP ROTATION PLAN.—An organic farm plan shall include a crop rotation plan that has been agreed to by the producer and the applicable governing State official.

(e) MANURING.—

(1) INCLUSION IN ORGANIC FARM PLAN.—An organic farm plan shall contain terms and conditions that regulate the application of manure to crops.

(2) APPLICATION OF MANURE.—Such organic farm plan shall provide that raw manure may be applied to—

(A) any green manure crop;

(B) any perennial crop;

(C) any crop not for human consumption; and

(D) any crop for human consumption, if such crop is harvested after a reasonable period of time after the most recent application of raw manure, determined by the certifying agent to ensure the safety of such crop, but in no event shall such period be less than 60 days after such application.

(3) CONTAMINATION BY MANURE.—Such organic farm plan shall prohibit raw manure from being applied to any crop in a way that significantly contributes to water contamination by nitrates.

(f) LIMITATION ON CONTENT OF PLAN.—An organic farm plan shall not include any production practices that are inconsistent with this title and the applicable State organic certification program.

SEC. 114. ANIMAL PRODUCTION PRACTICES AND MATERIALS.

(a) ORGANICALLY PRODUCED LIVESTOCK PRODUCTS.—

(1) SLAUGHTER LIVESTOCK.—

(A) RAISED IN ACCORDANCE WITH TITLE.—Except as provided in subparagraph (B), any meat, poultry, wild or domesticated game, or other nonplant life that is to be slaughtered and sold as organically produced shall be raised in accordance with this title.

(B) EXCEPTION.—With respect to any meat, poultry, wild or domesticated game, or other nonplant life that is to be slaughtered and sold as organically produced prior to January 1, 1995, such livestock shall be raised in accordance with this title for a minimum of the final 60 percent of the slaughter weight of such livestock.

(2) LAYING LIVESTOCK.—

(A) ORGANICALLY MANAGED.—Except as provided in subparagraph (B), any poultry from which eggs will be labeled as organically produced, shall be managed in accordance with this subsection prior to and during the period in which such eggs are sold.

(B) EXCEPTION.—Any poultry from which eggs will be labeled as organically produced prior to January 1, 1995, shall be managed in accordance with this subsection for not less than a 4-month period prior to the sale of such eggs and during the period in which such eggs are sold.

(3) DAIRY LIVESTOCK.—

(A) ORGANICALLY MANAGED.—Except as provided in paragraph (B), any dairy cow from which milk and milk products will be labeled as organically produced, shall be raised in accordance with this title prior to the sale of such milk and continuously thereafter.

(B) EXCEPTION.—Any dairy cow from which milk and milk products will be labeled "organically produced" prior to January 1, 1995, must be raised in accordance with this title for not less than a 12-month period prior to the sale of such milk and continuously thereafter.

(b) FEED.—

(1) ORGANICALLY PRODUCED FEED.—For a farm that produces livestock to be certified under this title, producers on such farm shall feed such livestock organically produced feed that meets the requirements of this title.

(2) PROHIBITED FEED.—For a farm that produces livestock to be organically certified under this

title, producers on such farm shall not use the following feed—

(A) plastic pellets for roughage;

(B) manure refeeding;

(C) any synthetic compounds;

(D) feed formulas containing urea;

(E) milk from livestock receiving antibiotics; or

(F) any feed or milk replacement formula that contains synthetic chemicals.

(c) SUPPLEMENTS.—For a farm that produces livestock to be organically certified under this title, producers on such farm shall not use growth promoters and hormones, whether implanted, ingested, or injected, including antibiotics and trace elements used to stimulate growth or production of livestock covered by this title.

(d) HEALTH CARE.—

(1) PROHIBITED PRACTICES.—For a farm that produces livestock to be organically certified under this title, producers on such farm shall not—

(A) use synthetic pesticides;

(B) use subtherapeutic doses of antibiotics;

(C) use internal parasiticides on a routine basis;

(D) administer medication other than vaccinations in the absence of illness as diagnosed by a veterinarian; or

(E) administer any vaccinations other than forward of the shoulder area.

(2) TREATED ANIMALS.—No product from any livestock that has been administered antibiotics in accordance with paragraph (1) shall be labeled as organically produced until at least 120 days has elapsed from the time such antibiotic was administered and such product is prepared for market.

(e) DRINKING WATER.—

(1) ANALYSIS OF DRINKING WATER.—A certifying agent may require, in order for a farm to be organically certified under this title, that producers on such farm submit for analysis any water to be made available for livestock covered by this title for the purpose of determining the quality, salinity, and purity of such water and the presence of pesticides and nitrates in such water.

(2) IMPURE WATER.—A farm shall not be certified under this title with respect to livestock if the certifying agent determines that drinking water to be made available to the livestock covered by this title is contaminated.

(f) LIVESTOCK IDENTIFICATION.—

(1) IN GENERAL.—For a farm that produces livestock to be certified under this title, producers on such farm shall ensure that each slaughter animal is identifiable from birth through processing.

(2) RECORDS.—To carry out paragraph (1), each producer shall keep accurate records on each slaughter animal including—

(A) dates;

(B) amounts and sources of all medications administered;

(C) all feeds bought and fed;

(D) all feed supplements used;

(E) the weight of each slaughter animal on entering organic production; and

(F) the weight of each animal at slaughter.

SEC. 115. POST-HARVEST HANDLING.

(a) IN GENERAL.—For a farm or handling operation to be organically certified under this title, producers on such farm or an individual on such handling operation shall not apply to any agricultural product covered by this title at any point during post-harvest handling, transportation, or storage—

(1) synthetic fumigants;

(2) sprouting inhibitors, ripeners, or growth regulators;

(3) preservatives;

(4) coloring agents; or

(5) waxes (except beeswax) or oils.

(b) MEAT.—For a farm or handling operation to be organically certified under this title, producers on such farm or individual on such handling operation shall ensure that organically produced meat does not come in contact with nonorganically produced meat.

SEC. 116. PROCESSING AND MARKETING.

For a handling operation to be certified under this title, each individual on such handling operation shall not, with respect to any agricultural product covered by this title—

(1) add any synthetic ingredient, including preservatives, coloring, flavoring, texturizers, or emulsifiers, during the processing or marketing of the product;

(2) add any ingredient known to contain excessive levels of nitrates, heavy metals, or toxic residues;

(3) add any sulfites, nitrates, or nitrites;

(4) add any ingredients that are not organically produced in accordance with this title and the applicable State organic certification program, unless such ingredients are approved by the Secretary or the applica-

ble governing State official, and unless such ingredients are included in the National List;

(5) use any packaging materials that contain fungicides, preservatives, or other chemical additives; or

(6) use any bag or container that had previously been in contact with any substance that could compromise the organic quality of such product.

SEC. 117. LABELING OF INGREDIENTS.

A processed agricultural product labeled as organically produced under this title shall not be sold or distributed for sale unless such product contains a label describing each ingredient contained in such product and the approximate percentage component of each such ingredient.

SEC. 118. ADDITIONAL GUIDELINES.

(a) IN GENERAL.—The Secretary, the governing State official, and the certifying agent shall utilize a system of residue testing to test products labeled as organically produced under this title to assist in the enforcement of this title.

(b) RESIDUE TESTING.—If the Secretary, the applicable governing State official, or the certifying agent determines that an agricultural product labeled as organically produced under this title—

(1) contains any detectable pesticide or other nonorganic residue, the Secretary, the applicable governing State official, or the certifying agent shall conduct

an investigation to determine if the organic certification program has been violated, and may require the producer or handler of such product to prove that such nonorganic residue or pesticide was not applied to such product; and

(2) contains any pesticide or other nonorganic residue in excess of 5 percent of the tolerance level established by the Administrator of the Environmental Protection Agency for that substance in food, or 5 percent of the action level for food as established by the Administrator of the Food and Drug Administration, such agricultural product shall not be labeled as organically produced under this title.

(c) RECORDKEEPING REQUIREMENTS.—Producers who operate certified farming or handling operations under this title shall maintain records covering the 5-year period immediately preceding certification concerning the production or handling of agricultural products labeled as organically produced under this title by such operation, including—

(1) a detailed history of substances applied to fields or agricultural products; and

(2) the names of persons who applied such substances, the dates, the rate and method of application of such substances.

SEC. 119. OTHER PRODUCTION AND HANDLING PRACTICES.

If a production or handling practice is not prohibited or otherwise restricted under this title, such practice shall be permitted unless the Secretary or the applicable governing State official determines that such practice would be inconsistent with the purposes of this title.

SEC. 120. VIOLATIONS OF TITLE.

(a) MISUSE OF LABEL.—Any individual who misuses, affixes, or otherwise tampers with an organically produced label, except in accordance with this title, shall be subject to a civil penalty of not more than $100,000 and imprisonment of not more than 5 years.

(b) FALSE CERTIFICATION.—Any individual who issues a false certification under this title to the Secretary, a governing State official, or a certifying agent shall be subject to the provisions of section 1001 of title 18, United States Code.

(c) INELIGIBILITY.—

(1) IN GENERAL.—Except as provided in paragraph (2), any producer who—

(A) issues a false certification;

(B) attempts to have an organically produced label affixed to an agricultural product that such producer knows to have been produced in a manner that is not in accordance with this title; or

(C) otherwise violates the purposes of the national organic certification program established under section 102(a);

as determined by the Secretary or the applicable governing State official, shall not be eligible, for a period of 5 years for the date of such occurrence, to receive certification under this title with respect to any farm or handling operation in which such producer has an interest.

(2) WAIVER.—Notwithstanding paragraph (1), the Secretary may reduce or eliminate such period of ineligibility if the Secretary determines that such modification or waiver would be in the best interests of the national organic certification program established under this title.

(d) REPORTING OF VIOLATIONS.—A certifying agent shall immediately report any violations of this title to the Secretary or the governing State official (if applicable) and shall decertify any individual determined to be in violation of this title.

(e) VIOLATIONS BY CERTIFYING AGENT.—Any certifying agent that is a private individual that violates the provisions of this title or that falsely or negligently certifies any farming or handling operation and that does not meet the terms and conditions of the applicable organic certification program as an organic operation, as determined by the Secretary or the governing State official (if applicable) shall—

(1) lose its accreditation as a certifying agent under this title; and

(2) be ineligible to be accredited as a certifying agent under this title for a period of not less than 3 years subsequent to such determination.

(f) APPLICABILITY TO OTHER LAWS.—Any transactions involving agricultural products labeled under this title as organically produced shall be subject to the provision of the Perishable Agricultural Commodities Act, 1930 (7 U.S.C. 499a et seq.).

(g) MISBRANDING.—The provisions of the Federal Meat Inspection Act (21 U.S.C. 601 et seq.) and the Poultry Inspection Act (21 U.S.C. 451 et seq.) concerning the misbranding of meat and poultry products shall be applicable to meat and poultry products labeled under this title.

SEC. 121. CITIZEN SUITS.

(a) IN GENERAL.—Except as provided in subsection (c), any citizen may commence a civil action on behalf of such citizen—

(1) against any person (including the United States or any other governmental instrumentality or agency to the extent permitted by the Eleventh amendment to the Constitution) who is alleged to be in

violation of the provisions of this title or any State organic certification program established under this title; or

(2) against the Secretary or the governing State official where there is an alleged failure of the Secretary or the governing State official to perform any act or duty required under this title that is not discretionary with the Secretary or the governing State official.

(b) JURISDICTION.—The district courts of the United States shall have original jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce the provisions of this title or any State organic certification program established under this title, or to order the Secretary or the governing State official to perform such act or duty, as the case may be, and to apply any appropriate civil penalties under section 119.

(c) NOTICE.—No action shall be commenced—

(1) under subsection (a)(1) of this section—

(A) prior to 60 days after the plaintiff has given notice of the alleged violation—

(i) to the Secretary;

(ii) to the State in which the alleged violation occurs; and

(iii) to any alleged violator of the title or State program; or

(B) if the Secretary or State has commenced and is diligently prosecuting a civil or criminal action in a court of the United States, or a State to require compliance with the title or State program, but in any action in a court of the United States any citizen may intervene as a matter of right; or

(2) under subsection (a)(2) prior to 60 days after the plaintiff has given notice of such action to the Secretary;

except that such action may be brought immediately after such notification in the case of an action under this section with respect to a violation of section 118(b)(2). Notice under this subsection shall be provided in such manner as the Secretary shall prescribe by regulation.

(d) PROCEDURAL PROVISIONS.—

(1) VENUE.—Any action under this title, or concerning a State program established under this title, or to require the Secretary or governing State official to take action under this title may be brought under this section only in the judicial district in which the individual is located.

(2) INTERVENTION.—In any action under this section, the Secretary, if not a party, may intervene as a matter of right.

(3) PROTECTION OF UNITED STATES INTERESTS.—When any action is brought under this section in a district court of the United States, the plaintiff shall serve a copy of the complaint on the Attorney General and the Secretary. No consent judgment shall be entered in any action in which the United States is not a party prior to 45 days following the receipt of a copy of the proposed consent judgment by the Attorney General and the Secretary.

(e) LITIGATION COSTS.—The court, in issuing any final order in any action brought pursuant to this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any prevailing or substantially prevailing party, if the court determines such award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security in accordance with the Federal Rules of Civil Procedure.

(f) STATUTORY OR COMMON LAW RIGHTS NOT RESTRICTED.—Nothing in this section shall restrict any right that any person (or class of persons) may have under any statute or common law to seek enforcement of any provision of this title or to seek any other relief (including relief against the Secretary or the governing State official or the certifying agent).

(g) CITIZEN.—For purposes of this section, the term "citizen" means a person or persons having an interest that is or may be adversely affected by a violation of the provisions of this title or by the failure of the Secretary or the governing State official to take actions required by this title.

(h) CIVIL ACTION BY STATE GOVERNORS.—The chief executive officer of a State may commence a civil action under subsection (a), without regard to the limitations of subsection (b), against the Secretary if there is alleged a failure of the Secretary to enforce the provisions of this title and the violation of this title is occurring in another State and is causing an adverse effect on the public health or welfare in the State of such chief executive.

SEC. 122. ADMINISTRATION.

(a) REGULATIONS.—Not later than 180 days after the date of enactment of this title, the Secretary shall issue proposed regulations to carry out this title.

(b) ASSISTANCE TO STATE.—

(1) TECHNICAL AND OTHER ASSISTANCE.—The Secretary shall provide technical, administrative, and Extension Service assistance to each State that implements an organic certification program under this title.

(2) FINANCIAL ASSISTANCE.—The Secretary may provide financial assistance to any State that im-

plements an organic certification program under this title.

SEC. 123. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated for each fiscal year such sums as may be necessary to carry out this title.

TITLE II—NATIONAL BOARDS

SEC. 201. DEFINITIONS.

As used in this title:

(1) ASSEMBLY.—The term "Assembly" means the National Organic Assembly created under section 211.

(2) ASSESSMENT.—The term "assessment" means funds collected by the Board under section 213.

(3) BOARD.—The term "Board" means the National Organic Board established under section 207.

(4) CONSUMER INFORMATION.—The term "consumer information" means any action taken to provide information to, and broaden the understanding of, the general public regarding the use, environmental benefits, nutritional attributes, and care of organically produced agricultural products.

(5) CERTIFYING AGENT.—The term "certifying agent" means the chief executive officer of a State or, in a State that provides by law for the Statewide election of a Commissioner of Agriculture, the Commis-

sioner of Agriculture, or an individual (including private entities) who is accredited by the Secretary as a certifying agent for the purpose of certifying a farm or handling operation as an organically certified farm or handling operation in accordance with this title.

(6) DELEGATE BODY.—The term "Delegate Body" means the Initial National Organic Delegate Body established under section 205.

(7) HANDLE.—The term "handle" means to sell, process, or package organically produced agricultural products.

(8) HANDLER.—The term "handler" means any individual in the business of handling organically produced agricultural products.

(9) INDIVIDUAL.—The term "individual" means any person, group of people, partnership, corporation, association, cooperative, or other entity.

(10) MARKETING.—The term "marketing" means the sale or other disposition of organically produced agricultural products in commerce.

(11) NOMINATING STATE OFFICIAL.—The term "nominating state official" means—

(A) in the case of a State with an established organic certification program under title I, the individual serving as the governing State official (as defined in title I) of such State; or

(B) in the case of a State without such a program—

(i) the chief executive officer of such State; or

(ii) if such State holds a Statewide election for the Commissioner of Agriculture, such Commissioner.

(12) NATIONAL LIST.—The term "National List" means the list established under section 111.

(13) ORDER.—The term "order" means an organic research, promotion, and consumer information order issued by the Secretary under section 203.

(14) ORGANICALLY PRODUCED.—The term "organically produced" means food that is produced using organic farming methods, as specified in title I, on an organically certified farm and handled by organically certified handling operations.

(15) ORGANIC STANDARDS BOARD.—The term "Organic Standards Board" means the board established under section 214.

(16) PRODUCER.—The term "producer" means an individual who produces an organically produced agri-

cultural product in the United States for sale in commerce.

(17) PROMOTION.—The term "promotion" means any action taken under this title, including paid advertising, to present a favorable image for organically produced agricultural products to the general public with the express intent of improving the competitive position and stimulating the sale of such products.

(18) RESEARCH.—The term "research" means any type of research relating to organically produced agricultural products and designed to advance the image, desirability, marketability, or quality of organically produced agricultural products.

(19) SECRETARY.—The term "Secretary" means the Secretary of Agriculture.

(20) STATE AND UNITED STATES.—The terms "State" and "United States" shall include each of the several States, the District of Columbia, and Puerto Rico.

SEC. 202. NATIONAL ORGANIC PROMOTION PROGRAM.

(a) IN GENERAL.—The Secretary shall establish a National Organic Promotion, Research, and Consumer Education Program to carry out the purposes described in subsection (b).

(b) PURPOSES.—The purposes of the National Organic Promotion, Research, and Consumer Education Program are—

(1) to authorize the establishment of an orderly procedure for the development and financing, through an adequate assessment, of an effective and coordinated program of research, promotion, and consumer information regarding organically produced agricultural products;

(2) to establish representative organic bodies to provide advice to the Secretary on all aspects of organic production under this Act, including the development of a National List;

(3) to strengthen the position of the organic industry in domestic and foreign markets;

(4) to maintain, develop, and expand domestic and foreign markets for organically grown agricultural products; and

(5) to allow for a democratic process by which individuals who are involved in the organic industry may determine whether a permanent National Organic Promotion, Research, and Consumer Education Program should be implemented after 1992.

SEC. 203. ISSUANCE OF ORDERS.

(a) IN GENERAL.—The Secretary shall issue, review, and make appropriate amendments to organic research, promotion, and consumer information orders applicable to handlers and producers of agricultural products that are organically produced and handled in a manner that meets the requirements of title I.

(b) NOTICE AND PUBLIC COMMENT.—The Secretary shall publish the order proposed to be issued under subsection (a) and provide reasonable notice and an opportunity for public comment concerning such order (including holding such public meetings as the Secretary determines to be necessary).

(c) SUBMISSION OF A PROPOSED ORDER OR AMENDMENT.—An individual who is affected by this title may submit a proposal for an order or amendment or request an opportunity for public comment on such order or amendment as described in subsection (a).

(d) INITIAL PROPOSAL.—Not later than 90 days after the Secretary receives a proposal for an order under subsection (c), the Secretary shall comply with subsection (b).

(e) FINDINGS AND ISSUANCE OF AN ORDER.—After notice of, and an opportunity for, public comment on an order or amendment is provided under subsection (b), the Secretary shall issue such order or amendment if the Secretary determines that, on the basis of the evidence introduced by such public comment, the issuance of such order or amendment will further the purposes of this title.

(f) EFFECTIVE DATE.—An order issued under subsection (a) shall become effective on the date on which the final order is published in the Federal Register.

SEC. 204. REQUIRED TERMS OF ORDERS.

Except as provided under section 216, an order issued by the Secretary under section 203 shall only contain the terms and conditions that are described in this title.

SEC. 205. INITIAL NATIONAL ORGANIC DELEGATE BODY.

(a) ESTABLISHMENT.—An order issued by the Secretary under section 203 prior to January 1, 1992, shall provide for the establishment, not later than 120 days after the effective date of such order, of the Initial National Organic Delegate Body.

(b) PURPOSE.—The Initial National Organic Delegate Body shall—

(1) elect the Initial National Organic Board and the Initial Organic Standards Board;

(2) make a recommendation as to whether an organic promotion program should be established and implemented; and

(3) shall provide recommendations to the Secretary concerning the implementation of titles I and II.

(c) COMPOSITION.—

(1) APPOINTMENT.—The Secretary shall appoint individuals to serve on the Delegate Body from among nominations received in accordance with this subsection.

(2) LIMIT ON PARTICIPANTS.—The membership of the Delegate Body shall not exceed 208 individuals and, to the extent practicable, shall have at least four members from each State.

(3) NOMINATIONS.—

(A) RECEIPT OF NOMINATIONS.—The Secretary shall only accept nominations for membership in the Delegate Body from a nominating State official, or through a written petition signed by 20 organic producers in a State.

(B) RESIDENCY REQUIREMENT.—A nominating State official or an organic producer in such State shall only nominate individuals who are residing in such State at the time of the nomination.

(C) INVOLVEMENT IN ORGANIC PRODUCTION.—Not less than 50 percent of the membership of the Delegate Body shall consist of individuals who—

(i) are involved in the production and handling of organically produced agricultural products; and

(ii) have derived at least 75 percent of the food-related business income and at least 50 percent of the total income of such individuals from food sold as organic or natural, for not less than a 3-year period preceding the appointment of such individuals to the Delegate Body.

(D) OTHER MEMBERS.—Not more than 50 percent of the membership of the Delegate Body shall consist of individuals who are—

(i) retailers of organic agricultural products and certifying agents; and

(ii) academic experts, consumers, environmental experts, and government officials who are experts in organic farming and processing methods.

(4) PROCEDURES FOR WRITTEN NOMINATION PETITION.—The Secretary shall establish and make public the procedures that shall govern the time and place for the filing of written petitions for nominations under paragraph (2).

(5) APPOINTMENT.—Not later than 60 days after the Secretary has received nominations for membership, or not later than 150 days after the effective date of this Act, whichever is later, the Secretary shall appoint members from the nominees, as provided under paragraph (2), to the Delegate Body.

(6) INSUFFICIENT NOMINATIONS.—

(A) IN GENERAL.—If the Secretary does not receive a sufficient number of eligible nominations from a State, the Secretary may nominate eligible individuals from such State for membership on the Delegate Body or, if the Secretary determines that there is not a sufficient number of eligible individuals in such State, the Secretary may waive the membership requirement for such State.

(B) REVIEW OF WAIVER.—The Secretary shall review the necessity for a waiver under subparagraph (A) on an annual basis.

(7) VACANCIES.—If a vacancy occurs on the Delegate Body, the Secretary, after receiving nominations from the nominating State official, shall appoint an individual to fill such vacancy for the remainder of the term of the Delegate Body.

(c) MEETINGS.—The Delegate Body shall meet at least once each year to conduct business, to nominate individuals for appointment to the Initial National Organic Board and the Initial Organic Standards Board if necessary, and to carry out the duties required under section 206.

(d) TERM.—

(1) TERM OF BODY.—The Delegate Body shall exist for a period not to exceed 3 years after the appointment of the members of such Body by the Secretary under subsection (b).

(2) LENGTH OF MEMBERSHIP.—Each member of the Delegate Body shall serve for the entire term of the Delegate Body.

(e) COMPENSATION.—A member of the Delegate Body shall serve without compensation.

(f) QUORUM.—A majority of the members of the Delegate Body who are entitled to cast a vote shall constitute a quorum for the purpose of conducting business.

(g) DECISIVE VOTES.—A majority of the votes cast at a meeting of the Delegate Body at which a quorum is present shall be decisive of a motion or election presented to such Delegate Body for a vote.

SEC. 206. DUTIES OF THE DELEGATE BODY.

(a) SELECTION OF MEMBERS AND CHAIRPERSON.—

(1) IN GENERAL.—At the initial annual meeting, the Delegate Body shall—

(A) elect a Chairperson;

(B) elect 15 members of the Delegate Body who shall each serve for a 3-year term on the Initial National Organic Board; and

(C) appoint, with the concurrence of the Secretary, 15 individuals who shall each serve for a 3-year term on the Initial Organic Standards Board.

(2) REQUIREMENT OF MAJORITY.—The election of the Chairperson and the membership of the Boards referred to in paragraph (1) shall be by a majority of the members of the Delegate Body who are present and voting in the initial annual meeting of such Body.

(3) CHAIRPERSON.—At each annual meeting after the initial annual meeting of the Delegate Body, the President of the Initial Board shall serve as the Chairperson of such Body.

(b) NATIONAL LIST.—The Delegate Body may make recommendations concerning the National List to the Initial Standards Board.

(c) ASSESSMENTS.—The Delegate Body shall recommend to the Initial Board and to the Secretary whether orders providing for assessments should be proposed in 1992.

(d) IMPLEMENTATION.—The Delegate Body shall provide recommendations to the Initial Board regarding the implementation of this Act.

SEC. 207. INITIAL NATIONAL ORGANIC BOARD.

(a) DUTIES.—There is established an Initial National Organic Board that shall—

(1) elect a President; and

(2) make recommendations to the Secretary regarding the implementation of titles I and II, including the enforcement provisions and shall make determinations relating to standards for the organic production of agricultural products and the composition of the National List.

(b) MEMBERSHIP.—The Initial Board shall—

(1) have 15 members, of which not less than 8 such members shall be individuals who own or operate an organic farming operation; and

(2) be composed of a representative geographic distribution of members.

(c) TERM.—The Initial National Organic Board shall exist for a period of not greater than 3 years, or until the establishment of the National Organic Board under section 212.

SEC. 208. INITIAL ORGANIC STANDARDS BOARD.

(a) DUTIES.—There is established an Initial Organic Standards Board that shall establish the proposed National List or amendments to such National List as provided for in section 111, and shall submit such proposals to the Secretary.

(b) MEMBERSHIP.—The Initial Organic Standards Board shall have 15 members of which—

(1) not less than 3 shall be individuals who own or operate an organic farming operation;

(2) not less than 3 shall be individuals who own or operate an organic handling operation;

(3) not less than 2 shall be individuals with expertise in the areas of environmental protection and resource conservation;

(4) not less than 2 shall be individuals who represent public interest or consumer interest organizations;

(5) not less than 1 shall be an individual who has expertise in the field of agronomy; and

(6) not less than 2 shall be individuals who have expertise in the fields of toxicology, ecology, or biochemistry.

(c) TERM.—The Initial Organic Standards Board shall exist for a period of not to exceed 3 years, or until the establishment of the Organic Standards Board under section 214.

SEC. 209. REFERENDUM.

(a) IN GENERAL.—After January 1, 1992, the Secretary may conduct referenda among producers and handlers of organic agricultural products to determine whether a majority of such producers and handlers favor the issuance of proposed orders under this title, the amendment of existing orders issued under this title, or the termination of existing orders issued under this title.

(b) PARTICIPANTS IN REFERENDUM.—The Secretary shall conduct referendum under this section among producers and handlers who—

(1) are not exempt from an assessment issued under section 213;

(2) are certified organic producers and handlers under title I; and

(3) produced or handled organically produced agricultural products during a representative period as determined by the Secretary.

(c) REQUIRED REFERENDUM.—The Secretary shall conduct a referendum under this section prior to the issuance of any order or amendment to an order providing for an assessment under section 203 or for the establishment of the National Organic Assembly.

(d) PUBLICATION.—The Secretary shall publish the results of any referendum conducted under this section within a reasonable time after such referendum.

(e) TERMINATION OF ORDER.—If the referendum conducted under this section indicates that an order or proposed order under section 203 is not favored by a majority of the producers and handlers voting in such referendum, the Secretary shall terminate or refuse to issue such order.

(f) CONFIDENTIALITY.—The Secretary shall hold the ballots and other information or reports that reveal, or tend to reveal, the vote of any individual under this section in strict confidence.

(g) SUBSEQUENT REFERENDA.—Not later than 90 days after the receipt of a petition requesting a referendum under this section by a majority of the producers and handlers of at least two States who have been certified as organic producers and handlers, the Secretary shall conduct such referendum as provided for in this section.

(h) DISAPPROVAL OF ORDER.—If an order providing for the collection of an assessment is disapproved in a referendum conducted under this section, the National Organic Board shall cease collecting such assessments the first day of the first month after such referendum is conducted or within 20 days after such referendum is conducted, whichever is later.

SEC. 210. ESTABLISHMENT OF NATIONAL ORGANIC ASSEMBLY.

(a) IN GENERAL.—An order issued by the Secretary under section 203 after the end of the term of the Delegate Body shall provide for the election, in accordance with this section, and establishment not later than 120 days after the date of such order, of the National Organic Assembly.

(b) ELECTION.—

(1) CONDUCTED BY SECRETARY.—The Secretary shall conduct the election required under subsection (a).

(2) COORDINATION WITH STATES.—The Secretary may conduct an election under this subsection in coordination with nominating State officials and certifying agents.

(3) ELIGIBLE TO VOTE.—Individuals who own or operate certified organic farming or handling operations under title I shall be eligible to vote in any election conducted under this section.

(c) COMPOSITION OF ASSEMBLY.—

(1) MEMBERSHIP.—The election carried out under this section shall, to the extent practicable, provide for elected membership in the Assembly from among persons who are—

(A) producers who operate farms or handling operations that are certified by the applicable governing State official as organic under title I; and

(B) certifying agents or academic experts, consumers, or government officials specializing in organic farming and handling methods, as determined by the Secretary.

(2) NUMBER OF MEMBERS WHO ARE PRODUCERS AND HANDLERS.—To the extent practicable, the Assembly—

(A) shall be comprised of at least two representatives from each State who are producers and handlers; and

(B) may have additional representatives from each State who are appointed by the Secretary from nominations received from the nominating State official on the basis of shares assigned to each State under paragraph (3).

(3) CALCULATION OF SHARES.—

(A) INITIAL PERIOD.—For the 4-year period immediately following the date on which the Delegate Body is terminated, shares shall be assigned under paragraph (2)(B) on the basis of one share for each dollar value of farm market value of organically produced goods marketed from such State, as determined by the Secretary based on the preceding calendar year and rounded to the nearest dollar.

(B) SUBSEQUENT PERIOD.—For each 4-year period subsequent to the period referred to in subparagraph (A), such shares shall be assigned on the basis of one share for each $1,000 of the average aggregate amount of assessments collected (minus refunds) under section 213 in such State from individuals described in section 213, rounded to the nearest $1,000 during the immediately preceding 4-year period.

(C) ASSIGNMENT BASED ON SHARES.—If the number of shares of a State under this paragraph is—

(i) more than 1,000 but less than 50,000, the Secretary shall appoint no more than three producers to be members of the Assembly for such State; or

(ii) more than 50,000, the Secretary shall appoint no more than four producers to be members of the Assembly for such State.

(4) NONPRODUCER MEMBERS.—The Assembly shall, subject to paragraph (5), be comprised of no more than two individuals who are nonproducers from each State.

(5) MAKEUP OF ASSEMBLY.—

(A) CERTIFIED ORGANIC PRODUCERS.—Not less than 50 percent of the membership of the Assembly shall consist of individuals who own or operate farms or handling operations that are certified as organic under title I.

(B) OTHER MEMBERS.—Not more than 50 percent of the membership of the Delegate Body may be individuals who are academic experts, consumers, or government officials specializing in organic farming and processing methods.

(d) INSUFFICIENT MEMBERSHIP.—

(1) IN GENERAL.—If there is not a sufficient number of eligible individuals elected to the Assembly from a State under this section, the Secretary may nominate eligible individuals from such State for membership on the Assembly or, if the Secretary determines that there is not a sufficient number of individuals who are eligible for nominations in such State, the Secretary may waive the membership requirement for such State.

(2) STATES WITHOUT AN ORGANIC CERTIFICATION PROGRAM.—

(A) IN GENERAL.—If a State has not implemented an organic certification program as provided in title I, or if the Secretary has not approved any certifying agent to certify organic farming or handling operations, the Secretary may appoint not to exceed one individual from such State to the Assembly.

(B) QUALIFICATION OF APPOINTED INDIVIDUAL.—An individual appointed under subparagraph (A) shall be engaged in the production or handling of agricultural products produced using organic methods, or shall be considered to be an expert in organic farming methods.

(C) NOMINATING PROCEDURE.—If, during any term of the Assembly, such State establishes an organic certification program under title I, or the Secretary approves a certifying agent for such State, the Secretary shall establish an election procedure consistent with this section to provide for representation of such State in the Assembly.

(D) TERM OF MEMBERSHIP.—The term of members of the Assembly appointed under this subparagraph shall parallel the terms of members of the Assembly as referred to in subsection (a).

(3) REVIEW OF WAIVER.—The Secretary shall review a waiver granted under paragraph (2), on an annual basis.

(e) VACANCY.—If a vacancy occurs on the Assembly, the Secretary, after receiving nominations from the nominating State official, shall appoint an individual to fill such vacancy for the remainder of the term of the original member.

(f) MEETINGS.—The Assembly shall meet annually to conduct business, to nominate individuals for appointment to the National Organic Board and the Organic Standards Board (if necessary), and for other purposes as provided for in section 211.

(g) TERM.—A member of the Assembly shall serve for a term of 4 years, except that the term of such member shall continue until the successor of such member, if any, is appointed in accordance with this section.

(h) COMPENSATION.—A member of the Assembly shall serve without compensation.

(i) DISQUALIFICATION.—If a member or alternate of the Assembly ceases to meet the eligibility requirements provided for in this section, as determined by the Secretary, such member shall be disqualified from serving on the Assembly.

(j) QUORUM.—A majority of the members of the Assembly who are entitled to cast a vote on the Delegate Body shall constitute a quorum for the purpose of conducting business.

(k) DECISIVE VOTES.—A majority of the votes cast at a meeting of the Assembly at which a quorum is present shall be decisive of a motion or election presented to the Assembly for a vote.

SEC. 211. DUTIES OF NATIONAL ORGANIC ASSEMBLY.

(a) INITIAL MEETING.—At the initial meeting of the Assembly, such Assembly shall—

(1) elect a Chairperson; and

(2) elect 15 members of the Assembly, who shall each serve for a 3 year term on the Initial National Organic Board; and

(3) appoint, with the concurrence of the Secretary, 15 individuals who shall each serve for a 3 year term on the Organic Standards Board.

(b) MAJORITY REQUIREMENT.—The election of the Chairperson of the Assembly and the members of the Boards shall be by a majority of the members who are present and voting in the meeting of the Assembly at which such election is made.

(c) CHAIRPERSON.—At each meeting after the initial meeting, the President of the Board shall serve as the Chairperson of the Assembly.

(d) RECOMMENDATIONS OF ASSEMBLY.—The Assembly shall—

(1) make recommendations concerning the rate of assessment prescribed by the order and any increase in such rate pursuant to section 213;

(2) determine the percentage of the aggregate amount of assessments collected in a State that such State shall receive under section 213;

(3) recommend to the Organic Standards Board and to the Secretary changes in the standards, including the composition of the National List, that serve as the basis for determining organically grown production methods and products;

(4) elect members to serve on the Board and appoint individuals to serve on the Organic Standards Board (with the concurrence of the Secretary) on the expiration of the terms of members of such Boards; and

(5) recommend to the National Organic Board research and promotion activities to be carried out under this title.

SEC. 212. NATIONAL ORGANIC BOARD.

(a) DUTIES.—The National Organic Board shall provide recommendations to the Secretary regarding the implementation of this Act.

(b) MEMBERSHIP.—The National Organic Board shall—

(1) be composed of 15 members, of which not less than eight shall be individuals who own or operate a certified organic farming operation; and

(2) have a representative geographic distribution of members.

(c) TERM.—The members of the National Organic Board shall serve for a period of 4 years. A member may be re-elected to serve on the National Organic Board.

(d) ACTIONS OF BOARD.—The National Organic Board shall—

(1) select a President;

(2) administer orders issued by the Secretary under section 203, and amendments to such orders, in accordance with such orders and consistent with this title;

(3) prescribe rules and regulations to effectuate such orders;

(4) receive, investigate, and report to the Secretary any accounts of violations of such orders;

(5) make recommendations to the Secretary with respect to amendments that should be made to such orders; and

(6) employ a manager and staff.

(e) BUDGET AND PLAN.—

(1) BUDGET.—

(A) DEVELOPMENT.—The National Organic Board shall prepare and submit to the Secretary a budget, on a fiscal period basis as determined appropriate by the Secretary, of the anticipated expenses and disbursements of the Board in the administration of the order, including probable costs of research, promotion, and consumer information.

(B) EFFECTUATION.—A budget under subparagraph (A) shall become effective on the approval of the Secretary.

(2) PLAN.—

(A) IN GENERAL.—Each budget, as referred to in paragraph (1), shall include a plan for research, promotion, and consumer information regarding organically produced agricultural products.

(B) EFFECTUATION.—Such plan shall take effect on the approval of the Secretary.

(f) CONTRACTS AND AGREEMENTS.—The Board may enter into contracts and agreements, with the approval of the Secretary, for—

(1) the development and implementation of plans under subsection (c); and

(2) the payment of the cost of such plan with funds collected under section 213(c).

(g) COMPENSATION.—A member of the Board shall serve without compensation, but may be reimbursed by the

Board from assessments for transportation expenses incurred in performing duties as a member of the Board.

(h) VOTING RESTRICTION.—Members of the Board who are not owners or operators of certified organic farming or handling operations shall not vote on matters respecting the use of assessments collected under this title.

SEC. 213 ASSESSMENTS.

(a) IN GENERAL.—An order issued after the termination of the Delegate Body shall provide that an assessment shall be paid in the manner prescribed in the order.

(b) IMPOSITION.—The order, as referred to in subsection (a), shall provide for the imposition and collection of assessments with regard to the production and handling of organically produced agricultural products as follows:

(1) PRODUCERS.—Producers of agricultural products labeled as being organically produced under title I shall pay annual assessments—

(A) with respect to producers who sell over $50,000 worth of organically produced agricultural products during each calendar year, based on the average sales from the immediately preceding 3 years as determined by the Secretary, of $100; and

(B) with respect to producers who sell under $50,000 worth of organically produced agricultural products during each calendar year, based on the average sales from the immediately preceding 3 years as determined by the Secretary, of $50.

(2) HANDLERS.—Individuals who operate handling operations that are certified as organic handling operations under title I and who are the first handlers of the organically produced agricultural products shall pay an annual assessment—

(A) with respect to handlers who market or process over $50,000 worth of organically produced agricultural products during each calendar year based on the average sales from the immediately preceding 3 years as determined by the Secretary, of $100; and

(B) with respect to handlers who market or process under $50,000 worth of organically produced agricultural products during each calendar year, based on the average sales from the immediately preceding 3 years, as determined by the Secretary, of $50.

(c) COLLECTION OF ASSESSMENT.—Except as provided in paragraph (4), the first handler of organically produced agricultural products shall—

(1) be responsible for the collection and payment to the Board, of producer and handler assessments under this section; and

(2) maintain a separate record of the agricultural products of each producer handled by such handler, including the organically produced agricultural products grown by such handler.

(d) PRODUCER AND HANDLER.—For purposes of subsection (c), an individual who is both a producer and a handler shall be considered the first handler of agricultural products produced by such individual.

(e) SUPPLEMENTAL ASSESSMENT.—

(1) IN GENERAL.—Subject to the recommendations of the Board and approval in a referendum as provided for in section 216, the Secretary may issue an amendment to an order stating that, in each calendar year, the rate of an assessment under this section shall be supplemented by an additional amount to be collected or paid as provided in this section.

(2) AMOUNT OF ASSESSMENT.—An additional amount under paragraph (1) shall not exceed 0.25 percent of the value of organically produced agricultural products sold by individuals from organically certified farms.

(f) ESTABLISHMENT OF ESCROW ACCOUNT.—The Board shall hold a sufficient portion of the assessments in escrow to ensure that all requests for refunds under section 221 may be honored.

(g) EXEMPTION.—An individual is exempt from an assessment under this section if such individual is—

(1) a producer who produces less than $5,000 of organically produced agricultural products per year; or

(2) a handler who handles less than $5,000 of organically produced agricultural products per year.

(h) CLAIMING AN EXEMPTION.—To claim an exemption under subsection (f) for a particular year, an individual shall prepare and submit, to the Board, an application that contains a description of the basis for such exemption and a certification that such individual will not exceed the limitation required under subsection (e) in the calendar year in which such application is submitted.

(i) USE OF ASSESSMENTS.—

(1) IN GENERAL.—An order issued by the Secretary under section 203 shall provide that funds paid to the Board as assessments—

(A) may be used by the Board—

(i) to pay for research, promotion, and consumer information described in the budget of the Board and for other expenses incurred by the Board in the administration of an order;

(ii) to pay such other expenses for the administration, maintenance, and functioning of the Board and the Organic Standards Board as may be authorized by the Secretary; and

(iii) to fund a reserve established under section 212(5); and

(B) except as provided in subsection (i), shall be used to pay the expenses incurred by the Secretary, including expenses of government employees in implementing and administering the order.

(j) REIMBURSEMENT.—An order issued by the Secretary under section 203 after January 1, 1992, shall provide that the Board shall reimburse the Secretary, from assessments, for any expenses incurred by the Secretary in conducting referenda under this title, except for the salaries of government employees who carry out such referenda.

(k) FALSE CLAIMS.—An order issued by the Secretary under section 203 shall provide that any promotion of organically produced agricultural product funded with assessments shall not make—

(1) any false or unwarranted claims on behalf of organically produced agricultural products; and

(2) any false or unwarranted statements with respect to the attributes or use of any product that competes with organically produced agricultural products for sale in commerce.

(l) PROHIBITION ON USE OF FUNDS.—An order issued under section 203 shall provide that funds collected by the Board through assessments shall not, in any manner, be used for the purpose of influencing legislation or governmental policy or action, except for making recommendations to the Secretary as provided for in this Act.

(m) BOARD RECORDS AND REPORTS.—

(1) BOARD.—An order issued under section 203 shall require the Board—

(A) to maintain books and records with respect to the receipt and disbursement of funds received by the Board through assessments collected under this section;

(B) to submit to the Secretary such reports as the Secretary may require for appropriate accounting; and

(C) to submit to the Secretary at the end of each fiscal year a complete audit report regarding the activities of the Board during such fiscal year.

(2) HANDLERS.—In order to provide information and data to the Board and the Secretary that is appro-

priate or necessary for the effectuation, administration, or enforcement of this title or any order or regulation issued under this title, such order shall require handlers who are responsible for the collection of assessments under this section—

(A) to maintain and make available for inspection by the Secretary such books and records as may be required by the order; and

(B) to file reports, at the times, in the manner, and having the content prescribed by the order, that concern the collection of such assessments.

(n) CONFIDENTIALITY.—

(1) IN GENERAL.—An order issued under section 203 shall require that all information obtained pursuant to subsection (h)(2) shall be kept confidential by all officers and employees of the Department of Agriculture and of the Board.

(2) DISCLOSURE.—The Secretary shall only disclose such information—

(A) the Secretary considers relevant in a lawsuit; or

(B) in the course of an administrative hearing brought at the request of the Secretary or to which the Secretary or any officer of the United

States is a party, involving the order with respect to which such information was furnished or acquired.

(3) NONCONFIDENTIAL INFORMATION.—The Secretary may—

(A) issue general statements based on the reports of a number of producers and handlers if such statements do not identify any individual who provides such information; or

(B) publish the name of any individual violating an order issued by the Secretary under section 203 along with a statement of the particular provisions of the order violated by such individual.

SEC. 214. ORGANIC STANDARDS BOARD.

(a) DUTIES.—The Organic Standards Board shall establish the proposed National List or amendments to such National List as provided in section 111 and shall submit such proposals to the Secretary.

(b) MEMBERSHIP.—The Organic Standards Board shall be comprised of 15 members, of which—

(1) not less than 3 shall be individuals who own or operate a certified organic farming operation;

(2) not less than 3 shall be individuals who own or operate a certified organic handling operation;

(3) not less than 2 shall be individuals with expertise in the areas of environmental protection and resource conservation;

(4) not less than 2 shall be individuals who represent public interest or consumer interest organizations;

(5) not less than 1 shall be an individual who has expertise in the field of agronomy; and

(6) not less than 2 shall be individuals who have expertise in the fields of toxicology, ecology, or biochemistry.

(c) TERM.—The members of the Organic Standards Board shall serve for a period of not to exceed 4 years. Such members may be reappointed to serve on the Organic Standards Board.

(d) DISAPPROVAL OF ORDER.—

(1) APPOINTMENT BY SECRETARY.—If a majority of those voting in the referendum conducted under section 209(c) do not favor the establishment of the National Assembly, the Secretary shall appoint the members of the Organic Standards Board in accordance with the provisions of this section.

(2) RESPONSIBILITIES.—The Organic Standards Board established under this subsection shall have the duties and responsibilities as specified in this section and section 215.

(3) OTHER TERMS AND CONDITIONS.—The Secretary may authorize the Organic Standards Board established under this subsection to hire a manager and staff and may, in accordance with relevant Appropriations Acts, pay necessary expenses incurred by such Organic Standards Board in carrying out the provisions of this title, as determined by the Secretary.

SEC. 215. PROPOSED NATIONAL LIST.

(a) IN GENERAL.—The Organic Standards Board (or the Initial Organic Standards Board) shall develop the proposed national list or proposed amendments to the National List for submission to the Secretary in accordance with section 111.

(b) CONTENT OF PROPOSED LIST.—

(1) ITEMIZATION OF SUBSTANCES.—The proposed list referred to in subsection (a) shall contain an itemization of—

(A) specific synthetic substances that may be used in the production and handling of agricultural products labeled as organically produced under title I, even though the use of such substances is prohibited elsewhere in title I; or

(B) specific natural substances that shall not be used in the production and handling of agricultural products labeled as organically produced under title I, even though the use of such substances would be allowed under other provisions of title I.

(2) SPECIFIC USES.—An exemption under paragraph (1)(A) or prohibition under paragraph (1)(B) with respect to a specific synthetic or natural substance may be limited to a specific use of such substance in a farming or handling operation.

(c) GUIDELINES FOR PROHIBITIONS OR EXEMPTIONS.—

(1) EXEMPTION FOR PROHIBITED SUBSTANCES.—The proposed national list may provide for the use of substances in an organic farming or handling operation that are otherwise prohibited under title I only if—

(A) the Organic Standards Board determines that the use of such substances—

(i) would not be harmful to human health or the environment;

(ii) is necessary to the production or handling of the crop because of the unavailability of wholly natural substitute products; and

(iii) is consistent with organic farming; and

(B) the specific exemption is developed in accordance with this section.

(2) PROHIBITION OF USE OF SPECIFIC NATURAL SUBSTANCES.—The proposed national list may provide for the prohibition on the use of specific natural substances in an organic farming or handling operation that are otherwise allowed under this title only if—

(A) the Organic Standards Board determines that the use of such substances—

(i) would be harmful to human health or the environment; and

(ii) is inconsistent with organic farming and the purposes of this title; and

(B) the specific prohibition is developed in accordance with this section.

(d) REQUIREMENTS.—In establishing the proposed national list or proposed amendments to the National List, the Organic Standards Board shall—

(1) review available information from the Environmental Protection Agency, the National Institute of Environmental Health Studies, and such other sources as appropriate, concerning the human and environmental toxicity of substances considered for inclusion in the proposed national list;

(2) work with manufacturers of substances considered for inclusion in the proposed national list to determine whether such substances contain inert materials that are synthetically produced; and

(3) submit to the Secretary, along with the proposed national list or any proposed amendments, the results of the Organic Standards Board evaluation of all substances considered for inclusion in the National List.

(e) EVALUATION.—In evaluating substances considered for inclusion in the proposed national list or proposed amendments to the National List, the Organic Standards Board shall determine—

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

(3) the probability of environmental contamination during manufacture, use, or misuse of such substance;

(4) the effects of the substance on human health;

(5) the effects of the material on biological and chemical interactions in the agroecosystem, including

the physiological effects of the substance on soil organisms (including consideration of salt index and solubility), crops, and livestock;

(6) the alternatives to using the substance in terms of practices or other available materials; and

(7) its compatibility with a system of sustainable agriculture.

(f) PETITIONS.—The Organic Standards Board shall establish procedures under which individuals may petition the Organic Standards Board for the purpose of evaluating substances for inclusion on the National List.

(g) REVIEW.—

(1) EVERY 4 YEARS.—The Organic Standards Board shall review each substance included as an exemption or prohibition on the National List at least once during each 4-year period beginning on the date such substance was initially included on the National List or on the date of the last review of such substance under this subsection.

(2) SUBMISSION TO SECRETARY.—The Organic Standards Board shall submit the results of a review under paragraph (1) to the Secretary with a recommendation as to whether such substance should continue to be included on the National List.

(h) CONFIDENTIALITY.—Any business sensitive material obtained by the Organic Standards Board (or the Initial Organic Standards Board) in carrying out this section shall be treated as confidential information by such Board and shall not be released to the public.

SEC. 216. PERMISSIVE TERMS OF ORDERS.

On the recommendation of the Board and with the approval of the Secretary, an order issued by the Secretary under section 203 may—

(1) require that, with respect to any Federal marketing order issued regarding organically produced agricultural products, that—

(A) is in effect prior to the date of the enactment of this title; and

(B) the Secretary determines is comparable to an order issued under this title;

there shall be paid to the Board, as provided for in section 213, that portion of the assessment under such section that is greater than the assessment, if any, paid on the organically produced agricultural products pursuant to such other marketing order;

(2) provide authority to the Board to designate different producer and handler payment and reporting schedules to recognize differences in production and

handling practices and procedures among producers and handlers;

(3) permit the Board to convene working groups made up of producers, handlers, or the general public to assist in the development of research, marketing, and standards programs for organically produced agricultural products;

(4) permit the Board to accumulate reserve funds from assessments collected under section 213 to permit an effective and continuous coordinated program of research, promotion, and consumer information in years in which production and assessment income may be reduced, except that any reserve fund so established shall not exceed the amount budgeted for operation of this title for 1 year;

(5) permit the Board to use, with the approval of the Secretary, funds collected under section 213 for the development and expansion of organically produced agricultural product sales in foreign markets;

(6) permit the Organic Standards Board to employ a manager and a staff; and

(7) provide for terms and conditions—

(A) incidental to, and not inconsistent with, the terms and conditions described in this title; and

(B) necessary to effectuate such order.

SEC. 217. PETITION AND REVIEW.

(a) PETITION.—

(1) IN GENERAL.—An individual who is subject to an order under this title may prepare and submit to the Secretary, within a period prescribed by the Secretary, a written petition—

(A) stating that such order, a provision of such order, or an obligation imposed in connection with such order is not in accordance with the law; and

(B) requesting a modification of the order or an exemption from such order.

(2) HEARING.—The Secretary shall promulgate regulations to permit an individual, who submits a petition under paragraph (1), an opportunity for a hearing on such petition.

(3) REVIEW.—After the hearing described in paragraph (2), the Secretary shall make a ruling on the petition that shall be subject to review under subsection (b).

(b) REVIEW.—

(1) COMMENCEMENT OF ACTION.—Not later than 30 days after the date that a ruling is made under subsection (a)(3), an individual may obtain a review of

such ruling by initiating a civil action in the district court of the United States for the district in which such individual—

(A) resides; or

(B) carries on business related to the subject matter of such action.

(2) PROCESS.—In civil action under this section, service of process may be made on the Secretary by delivering a copy of the complaint to the Secretary.

(3) REMANDS.—If the district court, as referred to in paragraph (1), determines that such ruling is not in accordance with law, such court shall remand the proceedings to the Secretary with directions—

(A) to make a ruling as such court shall determine to be in accordance with law; or

(B) to take such further proceedings as, in the opinion of such court, the law requires.

(4) ENFORCEMENT.—The pendency of proceedings instituted pursuant to this subsection shall not impede, hinder, or delay the United States or the Secretary from obtaining relief pursuant to section 214.

SEC. 218. ENFORCEMENT.

(a) JURISDICTION.—Each district court of the United States shall be vested with jurisdiction to enforce, and to prevent and restrain any individual from violating, any order or regulation made or issued under this title.

(b) REFERRAL TO ATTORNEY GENERAL.—

(1) GENERAL RULE.—Except as provided for in paragraph (2), if the Secretary is involved in a civil action under section 213, the Secretary shall refer the facts relating to such action to the Attorney General for appropriate action.

(2) EXCEPTION.—Notwithstanding paragraph (1), the Secretary shall not refer a violation of this title to the Attorney General if the Secretary determines that the administration and enforcement of the order or regulation that is involved in such violation would be adequately served by administrative action under subsection (c) or by providing a suitable written notice or warning to an individual committing such violation.

(c) CIVIL PENALTIES AND ORDERS.—

(1) CIVIL PENALTIES.—The Secretary may assess a civil penalty fine of not less than $500 nor more than $5,000 for each instance in which an individual violates any order or regulation issued by the Secretary under this title or fails or refuses to pay, collect, or remit any assessment or fee required of the individual under such order or regulation. Each violation shall be considered as a separate offense.

(2) CEASE-AND-DESIST ORDERS.—In addition to, or in lieu of, a civil penalty under paragraph (1), the Secretary may issue an order requiring an individual to cease and desist from continuing a violation.

(3) NOTICE AND HEARING.—The Secretary shall not assess a civil penalty or issue a cease-and-desist order under this subsection applicable to any individual unless the Secretary provides such individual with notice and an opportunity for a hearing before the Secretary with respect to such violation.

(4) FINALITY.—The decree of the Secretary assessing a civil penalty or imposing a cease-and-desist order on any individual under this subsection shall be final and conclusive unless such individual files an appeal of such decree with the appropriate United States Court of Appeals.

(d) REVIEW BY COURT OF APPEALS.—

(1) COMMENCEMENT OF ACTION.—Any individual, against whom a violation as referred to in subsection (c)(1) is found and a civil penalty assessed or cease-and-desist order issued under subsection (c), may obtain review of such penalty or order by—

(A) filing, not later than 30 days from the date on which such penalty is assessed or order issued, a notice of appeal in—

(i) the United States Court of Appeals for the circuit in which such individual resides or carries on business; or

(ii) the United States Court of Appeals for the District of Columbia; and

(B) simultaneously sending a copy of such notice by certified mail to the Secretary.

(2) RECORD.—The Secretary shall promptly file the record on which such violation under paragraph (1) was found in the court selected under paragraph (1)(A).

(3) STANDARD OF REVIEW.—The court referred to under paragraph (1)(A) shall set aside the findings of the Secretary only if such court determines that such findings are unsupported by substantial evidence.

(e) FAILURE TO OBEY ORDER.—

(1) IN GENERAL.—The Secretary may assess a civil penalty fine, of not more than $500 for each violation described under subsection (c)(1), to an individual who fails to obey a cease-and-desist order issued under subsection (c) after—

(A) such order has become final and unappealable or after the appropriate Court of Appeals has entered a final judgment in favor of the Secretary; and

(B) after opportunity for a hearing and for judicial review under the procedures described in subsections (c) and (d).

(2) CONTINUING OFFENSE.—Each day during which an individual fails to obey a cease-and-desist order shall be considered as a separate offense.

(f) FAILURE TO PAY PENALTIES.—

(1) IN GENERAL.—If an individual fails to pay an assessment of a civil penalty under subsection (c)(1), after such assessment has become a final and unappealable order or after the appropriate United States Court of Appeals has entered final judgment in favor of the Secretary, the Secretary shall refer such failure to pay to the Attorney General for recovery of the amount of such penalty in an appropriate district court of the United States.

(2) REVIEW OF FINAL ORDER.—In a recovery action described under paragraph (1), the validity and appropriateness of the final order imposing such civil penalty shall not be subject to review.

SEC. 219. INVESTIGATIONS AND POWER TO SUBPOENA.

(a) IN GENERAL.—The Secretary may make such investigations as the Secretary considers necessary—

(1) to carry out the responsibilities of the Secretary under this title; and

(2) to determine whether an individual has engaged in any practices that constitute a violation of this title, or any plan, rule, or regulation issued by the Secretary under this title.

(b) ADMINISTRATION.—For the purpose of an investigation under subsection (a), the Secretary may administer oaths and affirmations, subpoena witnesses, compel the attendance of such witnesses, take evidence, and require the production of any books, papers, and documents that are relevant to such investigation.

(c) SUBPOENA.—

(1) IN GENERAL.—To carry out subsection (b), the Secretary may compel the attendance of witnesses and the production of any such records through subpoena.

(2) REFUSAL TO OBEY SUBPOENA.—

(A) REQUEST FOR AID.—If an individual refuses to obey a subpoena issued to such individual, the Secretary may invoke the aid of any court of the United States within the jurisdiction in which such investigation or proceeding is carried out, or in which such individual resides or carries on business, in requiring the attendance and testimony of such individual and the production of applicable books, papers, and documents.

(B) AUTHORITY OF COURT.—The court under subparagraph (A) may issue an order requiring such individual to appear before the Secretary, produce records if ordered to do so by the Secretary, or to give testimony concerning the matter under investigation.

(C) CONTEMPT.—The court under subparagraph (A) may punish an individual who fails to obey an order issued under subparagraph (B) for contempt of court.

(d) SERVICE OF PROCESS.—Service of process to an individual in any action to enforce this section may be served in the judicial district in which such individual resides or wherever such individual may be found.

(e) JURISDICTION.—A hearing held under this section shall be located within the judicial district where the individual who is to provide evidence resides or has a principal place of business.

SEC. 220. REFUND OF ASSESSMENTS.

(a) IN GENERAL.—Notwithstanding any other provision of this title, a producer or handler of organically produced agricultural products against whom an assessment is made and collected under this title and who does not support the research and promotion program as described in this title, may receive from the National Organic Board a refund of any assessment paid under this title.

(b) TIME PERIOD FOR RECEIVING REFUNDS.—Refunds referred to in subsection (a), shall be made on a monthly basis by the Board. A request for such refund shall not include a request for a refund for any period in excess of the immediately preceding 3 months prior to such request.

(c) REQUEST TO RECEIVE REFUND.—An individual requesting a refund under this section shall—

(1) make a written request for such refund in a manner as shall be prescribed by the Secretary;

(2) make such request not later than 60 days after the end of any month during which such individual paid an assessment under this title and with respect to which the producer is requesting such refund; and

(3) submit satisfactory proof that such individual paid the assessment for which a refund is requested, as determined by the Board.

(d) PROVIDING REFUND.—Not later than 90 days after receiving a request under subsection (c), the Board shall make any refund requested available to the individual making such request.

(e) SURPLUSES.—The Secretary shall release any funds that are not refunded under this section in order to carry out this Act.

(f) REFUNDS UPON DISAPPROVAL OF ORDER.—If an order providing for the collection of assessments is terminated, the assessments collected from producers and handlers prior to such termination that have not been expended shall be refunded on a pro rata basis to eligible producers and handlers, after a deduction for a proportionate amount of the expenses incurred by the Secretary and the agency of government that assists in the administration of such order, when the order terminating the program established by this title is published by the Secretary.

SEC. 221. SUSPENSION AND TERMINATION.

(a) DETERMINATIONS OF SECRETARY.—If the Secretary determines that an order issued under section 203 obstructs or does not effectuate the purposes of this title, the Secretary shall terminate or suspend the operation of such order or provision.

(b) PERIODIC REPORTS.—The Secretary may periodically conduct a referendum to determine if organic producers and handlers support the continuation, termination, or suspension of any order issued under section 203 and in effect at the time of such referendum.

SEC. 222. REGULATIONS.

The Secretary may promulgate such regulations as are necessary to carry out this title.

SEC. 224. AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—There are authorized to be appropriated for each fiscal year such sums as may be necessary to carry out this title.

(b) ADMINISTRATIVE EXPENSES.—The funds appropriated under subsection (a) shall not be available for payment of the expenses or expenditures of the Board in administering an order issued under this title.

TITLE III—LOW INPUT LABEL DEMONSTRATION PROGRAM

SEC. 301. DEFINITIONS.

As used in this Act:

(1) PROGRAM.—The term "Program" means the National Low Input Demonstration Program established under section 302(a).

(2) SECRETARY.—The term "Secretary" means the Secretary of Agriculture.

(3) STATE.—The term "State" means each of the several States, the District of Columbia, and Puerto Rico.

(4) TRANSITION FARM.—The term "transition farm" means a farm that meets all of the standards required under title I and the applicable State program but that has not yet met the 3 year requirement to be certified as an organic farm.

SEC. 302. NATIONAL LABEL DEMONSTRATION PROGRAM.

(a) In General.—The Secretary shall establish a National Low Input Label Demonstration Program for the purposes described in subsection (b).

(b) Purposes.—The purpose of the Program is—

(1) to recognize that many farmers have substantially reduced the use of chemical inputs and have adopted sustainable methods of farming;

(2) to authorize the establishment of a grant program for States to explore the ramifications of establishing a low input label for agricultural products produced using low input sustainable agriculture methods of production;

(3) to provide a labeling option for farmers who are in transition from traditional to organic farming systems;

(4) to evaluate the impact that a low input label and a transition label would have on consumer purchasing decisions and organic markets; and

(5) to assess whether the availability of a low input label and a transition label would provide a significant incentive to motivate farmers to adapt more sustainable agricultural practices.

SEC. 303. ADMINISTRATION.

(a) GRANT PROGRAM.—The Secretary shall make a grant from amounts appropriated under section 306 to not less than 4 States that—

(1) have implemented a State organic certification program under title I;

(2) can designate a limited marketing area within the State in which the label established under this title could be used and controlled;

(3) submit a competitive proposal that meets the requirement established by the Secretary for conducting the Program; and

(4) will carry out a Program under this title.

(b) PREFERENCE.—In making grants under subsection (a), the Secretary shall give preference to any State that will assist in the development and implementation of the Program by making funds or other resources of such State available for use in the Program.

(c) RESPONSIBILITIES OF RECIPIENT.—Each State recipient of a grant under subsection (b) shall—

(1) design a demonstration project that meets the requirements of the Secretary;

(2) designate farming operations eligible to participate in the Program as low input sustainable farms, as determined and approved by the panel of experts estab-

lished by section 1466(1) of the Food Security Act of 1985 (7 U.S.C. 4706(1));

(3) designate farming operations eligible to participate as transition farms;

(4) authorize the sale of the products of the sustainable farms designated under paragraphs (2) and (3) in retail establishments in such State; and

(5) prepare and submit a final report as required by section 305.

SEC. 304. ESTABLISHMENT OF LABELS.

(a) IN GENERAL.—The Secretary shall establish two experimental labels to be affixed to agricultural products that have been produced on low input sustainable farms and transition farms designated for participation in the Program.

(b) CONTENT OF LABELS.—The Secretary shall establish—

(1) a label that states that an agricultural product has been "produced on a LISA farm" and which that bear the seal of the Department of Agriculture; and

(2) a label that states that an agricultural product has been produced in "transition to organic" and that shall bear the seal of the Department of Agriculture.

(c) AFFIXATION OF LABEL.—The chief executive officer of a State shall affix the labels referred to in subsection (a) to an agricultural product only if such product has been produced in accordance with the requirements established by the panel of experts established by section 1466(1) of the Food Security Act of 1985 (7 U.S.C. 4706(1)).

SEC. 305. REPORTS.

Not later than 2 years after the date of enactment of this title, the chief executive officer of a State shall prepare and submit a final report that contains the results of the Program to—

(1) the Secretary;

(2) the Committee on Agriculture of the House of Representatives; and

(3) the Committee on Agriculture, Nutrition, and Forestry of the Senate.

SEC. 306. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as may be necessary to carry out this title.

TITLE IV—NATIONAL LABORATORY ACCREDITATION

SEC. 401. PURPOSES.

The purpose of the program established by this title is—

(1) to protect and assure individuals involved in the interstate commerce and consumption of food that the representations by laboratories as to chemical residues or the lack of residues in food is accurate;

(2) to authorize the Secretary of Agriculture, in consultation with other agencies, to establish minimum standards concerning the quality of the equipment and staff and testing protocols used by such laboratories;

(3) to provide for public disclosure of the results concerning the accreditation of laboratories; and

(4) to require disclosure to the Secretary of Agriculture of all residue levels that exceed tolerances set by the Administrator of the Environmental Protection Agency and the Administrator of the Food and Drug Administration and of all residue levels for substances prohibited or under special review by the Administrator of the Food and Drug Administration.

SEC. 402. DEFINITIONS.

As used in this title:

(1) AGRICULTURAL PRODUCTS.—The term "agricultural products" means any agricultural commodity or product whether raw or processed, including any commodity or product derived from livestock or fowl that is marketed in the United States for human and livestock consumption.

(2) CERTIFICATE.—The term "certificate" means a certificate of accreditation issued under this title.

(3) LABORATORY.—The term "laboratory" means any facility or vehicle that is owned by an individual or

a public or private entity and is equipped and operated for the purpose of carrying out pesticide residue analysis on agricultural products.

(4) PESTICIDE.—The term "pesticide" means any substance that alone, in chemical combination, or in any formulation with one or more substances, is defined as a pesticide in section 2(u) of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136(u)).

(5) REFERENCE LABORATORY.—The term "reference laboratory" means a laboratory that is owned and operated by a governmental regulatory agency for the principal purpose of analyzing samples referred by other laboratories for confirmatory analysis.

(6) SECRETARY.—The term "Secretary" means the Secretary of Agriculture.

SEC. 403. NATIONAL LABORATORY ACCREDITATION PROGRAM.

(a) ESTABLISHMENT OF PROGRAM.—The Secretary shall establish a National Laboratory Accreditation Program under which laboratories that conduct residue testing of agricultural products under this Act, or that make claims to the public or buyers of agricultural products concerning chemical residue levels on agricultural products, shall be determined to meet certain minimum quality and reliability standards.

(b) Requirements.—In order to be accredited under this title, a laboratory shall—

(1) prepare and submit an application for accreditation to the Secretary;

(2) complete a series of tests required by the Secretary; and

(3) comply with any additional terms and conditions as are determined necessary by the Secretary.

(c) Consultation.—The Secretary shall, in consultation with the Administrator of the Food and Drug Administration, establish minimum standards for laboratories concerning—

(1) quality assurance programs;

(2) laboratory facilities;

(3) equipment;

(4) normal scientific methodologies;

(5) qualifications of directors and other personnel; and

(6) any other area concerning the operation or maintenance of a laboratory that is determined by the Secretary to be necessary to ensure accurate and complete analysis.

(d) Exceptions.—This title shall not apply to—

(1) a laboratory operated by a government agency;

(2) a laboratory operated by a corporation that only performs analysis of residues on agricultural products for such corporation or any wholly owned subsidiary of such corporation and does not make claims to the public or buyers based on such analysis;

(3) a laboratory operated by a partnership that only performs analysis of residues on agricultural products for the partners of such partnership and does not make claims to the public or buyers based on such analysis; or

(4) a laboratory not operated for commercial purposes that performs pesticide chemical residue analysis on agricultural products for research or quality control for the internal use of an individual who is initiating the analysis.

SEC. 404. ACCREDITATION.

(a) IN GENERAL.—The Secretary shall issue certificates of accreditation to laboratories that meet the requirements of this title, as determined by the Secretary.

(b) REQUIREMENTS FOR ACCREDITATION.—To receive accreditation under this title, a laboratory shall prepare and submit an application for accreditation to the Secretary and shall complete all tests of samples required, and meet all minimum standards established, by the Secretary under section 403.

(c) INTERIM ACCREDITATION.—

(1) IN GENERAL.—On the filing by a laboratory of a complete application for accreditation under section 405, the Secretary may issue a certificate of interim accreditation to such laboratory pending the full approval of such application by the Secretary.

(2) CRITERIA.—The Secretary may issue certificates of interim accreditation to laboratories that the Secretary determines are likely to successfully meet all requirements for full accreditation. In making such determination, the Secretary shall consider the experience and current personnel of such laboratory.

(3) DURATION.

(A) COMPLETION OF EVALUATION.—An interim accreditation shall be effective until the Secretary either grants or denies such laboratory full accreditation.

(B) MAXIMUM PERIOD.—An interim accreditation shall not be effective for more than 180 days after the date of the issuance of such.

(C) NON-RENEWABLE.—An interim accreditation shall not be immediately renewable.

(d) FAILURE TO MEET ACCREDITATION STANDARDS.—The Secretary shall deny an application for accreditation or shall revoke any existing accreditation with respect to any laboratory that—

(1) does not complete successfully all tests of samples and other tests required by the Secretary;

(2) does not pass an onsite inspection conducted by the Secretary; or

(3) is not in compliance with the national laboratory accreditation program established under this title.

(e) LIMITED ACCREDITATION.—The Secretary may issue certificates of accreditation to laboratories that are limited to specific fields of testing.

(f) DURATION OF ACCREDITATION.—A certificate of accreditation shall be effective for not more than 3 years from the date of the issuance of such.

(g) RENEWAL OF ACCREDITATION.—A certificate of accreditation for a laboratory may be renewed on the completion of all tests of samples required by the Secretary and on a review of such laboratory by the Secretary to determine that such laboratory meets the requirements of this title.

SEC. 405. SAMPLES.

(a) PERFORMANCE EVALUATION SAMPLES.—

(1) PROVIDED BY SECRETARY.—The Secretary shall provide performance evaluation samples to any laboratory that has applied for accreditation or for a renewal of accreditation under this title.

(2) ANALYSIS BY LABORATORY.—A laboratory described in paragraph (1) shall analyze such performance evaluation samples and submit the results of such analysis to the Secretary.

(3) TESTING METHODS.—Samples shall be tested by the laboratory according to methods specifically approved for such purpose by alternate methods of demonstrated adequacy or equivalence, as determined by the Secretary.

(b) RESULTS OF TESTING.—

(1) SUBMISSION OF RESULTS.—The laboratory shall submit the results of the tests conducted under subsection (a) to the Secretary on forms provided by the Secretary, on or before the date determined by the Secretary.

(2) EVALUATION OF TESTS.—The Secretary shall evaluate the results of such tests achieved by the laboratory and shall determine whether such laboratory is capable of undertaking an accurate analysis of chemical residues in agricultural products.

(c) REVIEW OF ACCREDITATION.—The Secretary shall provide performance evaluation samples for analysis to laboratories accredited under this title not less than two times a year.

(d) IDENTIFICATION.—In any arrangement between laboratories that involves the transfer of performance evaluation samples or portions of such samples, the analyzing laboratory shall be identified in all reports regarding such samples and shall be the laboratory for purposes of accreditation.

SEC. 406. APPLICATION.

(a) CONTENTS OF APPLICATION.—An application for accreditation or for renewal of accreditation under this title shall be prepared and submitted to the Secretary and shall include—

(1) the name and address of the laboratory;

(2) the name and address of the owners and managers of such laboratory;

(3) a statement concerning the type of analysis the laboratory intends to conduct;

(4) a brief history of the laboratory and its previous operations; and

(5) such other information as may be required by the Secretary.

(b) RESTRICTIONS ON SUBMISSION OF APPLICATION.—A laboratory that has been denied, or has lost, accreditation under this title shall not reapply for accreditation until the expiration of at least 1 year after such denial or loss of accreditation.

SEC. 407. REPORTING.

(a) IN GENERAL.—Each laboratory or individual that performs, brokers, or otherwise arranges for the performance of pesticide chemical analysis of food shall prepare and report, to the Secretary and, by certified mail, to the owner of such food, that shall contain any finding of pesticide chemical residues in such food—

(1) for which no chemical residue tolerance has been established; or

(2) that is in excess of residue tolerances or tolerances for a pesticide suspended, banned, or otherwise not permitted by the Environmental Protection Agency.

(b) TIMING OF REPORT.—A laboratory shall submit the report required under subsection (a) to the Secretary as soon as practicable after the completion of the analysis of such food.

(c) GUIDELINES.—The Secretary shall adopt standardized reporting guidelines to be applied to laboratories under this section and shall provide such guidelines to laboratories accredited under this title, as well as other sources of information regarding applicable pesticide chemical tolerances.

SEC. 408. FEES.

(a) IN GENERAL.—At the time that an application for accreditation is received by the Secretary, and annually thereafter, a laboratory seeking such accreditation or a renewal of accreditation under this title shall pay a nonrefundable accreditation fee.

(b) AMOUNT OF FEE.—The fee required under subsection (a) shall be established by the Secretary in an amount that will assist in offsetting the cost of the program established by this title.

(c) REIMBURSEMENT OF EXPENSES.—Each laboratory that is accredited under this title or that has applied for accreditation under this title shall reimburse the Secretary for reasonable travel and other expenses necessary to perform onsite inspections of such laboratory.

(d) ADJUSTMENT OF FEES.—The Secretary may, on an annual basis, adjust the fees imposed under this section, as necessary to support the full costs of the program established by this title.

(e) GOVERNMENT-OWNED LABORATORY.—A State or local government-owned laboratory that performs work only in a reference capacity as a reference laboratory shall be exempt from the payment of any accreditation fee required under this section.

SEC. 409. PUBLIC DISCLOSURE.

The results of the evaluations of laboratories conducted by the Secretary under this title shall be made available to the public on request.

SEC. 410. REGULATIONS.

The Secretary shall promulgate regulations to carry out this title.

SEC. 411. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as may be necessary to carry out this title.

SEC. 412. EFFECTIVE DATE.

This title shall become effective on January 1, 1991.

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Organic Foods Production Act of 1990: S. 2108

Technical Review from a Certification Perspective

Including Point-by-Point
Commentary and Recommendations

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Executive Summary

The preamble to S.2108 states that consumers want "reliable information about which products are organically produced," and want to be assured that "products labeled as 'organically produced' are not produced with, or handled with, compounds that cause adverse human health or environmental effects." Scientific Certification Systems has conducted an independent evaluation of the legislation from a technical perspective, focussing on the extent to which appropriate certification protocols have been integrated into the process to support these goals.

The resulting critique raises serious questions about a number of key provisions of the bill. A section-by-section analysis follows, with constructive suggestions for modifications provided wherever possible. While the bill represents a positive step forward in its attempt to unify organic standards under one national banner, it is our conclusion that extensive revisions are required if this legislation is to provide true, verifiable assurances to the consuming public.

The major findings of this review are as follows:

1. The public views "organic" food as products grown or produced naturally without the use of chemicals, such as pesticides and hormones. Under the proposed bill, chemicals of both natural and synthetic origin will be permitted to be used during the production of organic products, contrary to consumer expectations. For example, meat producers will be permitted the use of a wide variety of synthetic drugs and antibiotics during a significant segment of the production phase. These provisions could easily damage the integrity of organic farming, and lead instead to the proliferation of chemically-treated organic products.

2. An underlying assumption of the proposed legislation is that naturally-derived chemicals are generally safe to humans and the environment, while synthetic chemicals are not. Available toxicity research does not support this assumption. For example, Rotenone, a plant-derived (botanical) pesticide, is highly toxic to fish, and has an acute oral toxicity to rats approximately 20 times greater than the synthetic pesticide, Malathion. As a rule, botanical pesticides are broad-spectrum poisons, destroying beneficial insects along with target pests. The proposed legislation permits the unrestricted use of these naturally-derived pesticides, even though important health data is often lacking and no practical analytical procedures exist to test for their presence in food.

3. According to the provisions of the bill, organic producers and handlers will dominate all aspects of the certification process, including the establishment of standards, the approval of pesticides for use, and the actual certification of products. Board compositions are structured to ensure majority rule by producers and handlers. This arrangement raises serious conflict of interest concerns.

4. The bill establishes an arbitrary standard for pesticide residue levels which is neither enforceable nor necessarily representative of the highest achievable standards. The 5% rule, under which synthetic pesticide residues are permitted at levels up to 5% of the EPA tolerance level, is too strict to be enforced for 80% of the pesticides currently registered for use, and not strict enough to make a difference for the remaining pesticides.

5. The bill vests final authority with the Department of Agriculture for determining whether or not synthetic or natural pesticides used on organic produce are harmful to the environment or risky for human consumption. Thus, the same agency that promotes organic agriculture will be responsibile for regulating it. This concentration of authority in the U.S.D.A. is questionable. We believe that the U.S. Environmental Protection Agency (EPA) and Food and Drug Administration (FDA) are the more appropriate regulatory agencies.

6. Additionally, the bill vests authority for the accreditation of laboratories in the Department of Agriculture. The Secretary would have final authority to determine which laboratories will be allowed to perform independent pesticide residue analysis in the marketplace. While the bill gives the Secretary *discretionary* authority to grant or deny accreditation, such accreditation should be based on clearly defined performance standards. Again, the EPA and FDA are the agencies normally authorized to administer laboratory accreditation programs.

7. The bill establishes a grant program for labelling products grown by "low input sustainable agriculture" (LISA) methods without defining minimum LISA standards or establishing LISA certification requirements. Presently, LISA is used to define a variety of pest management programs, some of which may actually *increase* the number of pesticide applications or *increase* the toxicity of the pesticides applied. It is therefore critical that standards be defined and reviewed before labelling programs are established.

Title 1

P. 3. Line 5. Finding (2):

"Organic farming methods promote more sustainable agricultural practices than traditional farming methods using high levels of chemicals."

The underlying assumption that organic farming is more "sustainable" than other farming approaches begs for closer examination. Not only does this assumption fail to consider the potential environmental toxicity of certain organic materials, such as botanical pesticides and high nitrate fertilizers, but it rests on a narrow view of "sustainability" itself.

Organic production does not necessarily mean that fewer chemicals are used. Organic apples, for example, may be treated with more than twice the number of pesticide applications as their commercial counterparts. (Compare the attached pesticide disclosure from a typical conventional apple grower to the chart which describes an organic pesticide regimen recommended to organic apple growers in the Pacific northwest.) Increased usage of Pyrellin (combination of Pyrethrum and Rotenone) and Pyrenone (combination of Pyrethrum and piperonyl butoxide) has also been reported this year on such crops as grapes, leaf lettuces, head lettuce and cabbage.

In addition, the use of botanical pesticides contradicts the notion of sustainability because **these pesticides are broad spectrum poisons, which destroy beneficial insects along with the target pests.**

If sustainability is truly the goal, then objective toxicity considerations must take precedence over the "natural vs. synthetic" debate. (See attached "Botanical Pesticides: Literature Review.")

The production of pyrethrums presents an interesting case in point. Natural pyrethrum is produced from dried, ground chrysanthemum flowers and is used as an insecticide. The most potent strains are grown at high elevations (above 7,000 feet) and in third world countries near the equator. In such countries, there are few if any pesticide regulations, and enforcement, for all practical purposes, is non-existent.

In order to supply even a fraction of total U.S. agricultural production, tens of thousands of acres of chrysanthemums would need to be planted. With increased demand for natural pyrethrum, local farmers will face growing pressure to produce chrysanthemum for export rather than crops for indigenous use. This large-scale demand will in turn lead to monocropping of this botanical pesticide source, a practice which runs counter to the goal of sustainability, and which inherently relies on heavy use of pesticides. Residues from such pesticides may easily end up in the pyrethrum formulations sold for "organic" use.

Pg. 9. Definition 20:

The term "Secretary" means the Secretary of Agriculture.

The Secretary of Agriculture is given primary authority over the establishment of standards, enforcement, and all other aspects of this legislation. **The concentration of authority in the hands of the Department of Agriculture poses fundamental conflict of interest questions, in that the Department should not be charged with both the task of promoting agriculture and the task of regulating it.** In California, controversy over a similar concentration of power in the California Department of Food and Agriculture has erupted into a major battle over the future of pesticide regulation authority.

Because the establishment of national organic standards is implicitly intertwined with the issue of food safety, **serious consideration should be given to shifting authority from the Department of Agriculture to the FDA and EPA**, the two agencies that are most experienced in the implementation of food safety programs and equipped to conduct enforcement.

Pg. 11. Line 22. Sec. 103. (e)(1):

"RESTRICTION — On or after September 1, 1992, no individual may affix a label to an agricultural product that infers, directly or indirectly, that such a product is organically, naturally or ecologically produced, grown, processed, or marketed, except in accordance with this title and an approved State organic certification program implemented under this title."

This labelling restriction is overbroad in its inclusion of the term "ecologically produced." Certain non-organic integrated pest management farming techniques may be proven to be more ecologically sound than organic techniques, and should be permitted to make the ecological claim. For example, an organic farmer who uses a phytotoxic (i.e., killing every plant in direct contact) cow manure to fertilize his ground may cause more damage to the soil than a conventional grower using a synthetic fertilizer. On the other side of the argument, a farmer who uses absolutely NO botanical pesticides may wish to distinguish himself from the traditional organic farmer by designating his food as "ecologically" or "biologically" grown.

The rule for labelling should instead insist that any claim be fully substantiatable, and **any restrictions associated with this bill should apply specifically and strictly to the terms "organic" and "organically produced."**

Pg. 12, Line 9, Sec. 103 (e)(3):

Paragraph (1) shall not apply to imported agricultural products with labels that infer that such product is organically or naturally produced if the Secretary determines that such products have been produced and handled under an organic program that provides safeguards and guidelines governing the production and handling of such products that are at least equivalent to the requirements of this Act.

Accurate assessment of "organic" claims on imported products will be extremely difficult unless such products have undergone rigorous third party certification. A 1986 General Accounting Office report revealed that only 1% of imported food shipments are presently tested by the Food and Drug Administration for pesticide residues. The report went on to say that whole commodity classes from some countries were not tested at all.

Very few countries have pesticide regulations or enforcement procedures which even come close to matching those of the U.S., and many countries have no pesticide regulations whatsoever.

Under this bill, the Secretary of Agriculture would have authority to declare a given country qualified to ship food under the organic program, even though these countries may lack such basic safeguards as registration of pesticides.

This bill should either clearly spell out the mechanisms by which products will be deemed to meet U.S. organic standards, or should forbid the labelling of imported products as "organic."

Pg. 13, Line 23, Sec. 104, (a)(5):

"Any program established under this title shall ... require annual on-site inspection of each farm and handling operation that has been certified under this title ..."

The annual on-site inspection requirement does little to assure producer compliance with specified standards. Conducted on an annual basis, the inspector will have little opportunity to observe critical production factors which may arise on a seasonal or periodic basis. Moreover, the term "on-site inspection" is far too ambiguous to ensure serious and thorough evaluation of a production system.

The annual on-site inspection has its roots in existing state and private organic certification programs, which were designed to regulate a small cottage industry based on trust and personal contacts. However, as larger, more sophisticated operators enter the picture, such inspections are more likely to be manipulated and circumvented. If the organic industry is to maintain its credibility in this era of growth, it must adopt FDA-type certification protocols based on sound scientific review principles.

At a minimum, the following inspection standards should be required:

1. The producer should provide a full disclosure of production practices, including a listing of all chemicals and non-chemical controls used for fertilization, soil amendment, pest control, and disease control, for his or her organic products.
2. Additionally, the producer should provide a full disclosure of chemicals used on any non-organic acreage or products under production which might be a source of potential contamination.
3. The certifying agent should conduct a feasibility review to determine whether the disclosed production plan is realistic in view of regional and commodity-specific conditions, and to determine whether adequate analytical procedures exist to verify each aspect of the disclosure.
4. Inspections should be carried out on a crop by crop, field by field basis, with an assessment of each critical control point (i.e., point of potential violation or contamination) including drift potential from neighboring fields.
5. The inspector should maintain the right to make unannounced site visits at least once during the production of each crop.

In addition, product sampling and testing for verification purposes should be considered an integral part of any inspection process. This point is discussed in greater detail below.

Pg. 14, Line 1, Sec. 104 (a)(6) and Pg. 41, Line 19, Sec. 118 (b):

Sec. 104 (a)(6) "Any program established under this title shall ... require periodic residue testing of agricultural products that have been produced on organically certified farms and handled through organically certified handling operations to determine whether such products contain any pesticide or other non-organic residue or natural toxicants."

This provision is wholly inadequate to assure consumers that products will in fact meet the specified standards. Consider the following:

1) The majority of botanical pesticides in use today lack practical analytical methods — that is, there are no practical procedures for detecting residues from these pesticides at the levels likely to be present in food. As such, **the public has no way of tracking the build-up of these residues in food or in the environment.**

2) Without a full disclosure of chemicals being applied to neighboring fields, it will be impossible to establish an accurate drift monitoring testing plan, since standard "Multi-residue" testing procedures cannot pick up a large percentage of the pesticides actually in use today. **During the course of our testing,**

we have observed drift residues in up to 70% of samples tested in certain growing regions. These residues, a result of accidental contamination rather than actual application, would be in violation of the organic standards.

3) The rate of accidental contamination would also be expected to increase as more and more mainstream farmers convert small portions of their total acreage to organic, but retain conventional pesticide spraying practices on their remaining acreage.

This section and other sections of the bill pertaining to residue testing (e.g., Sec. 118) require serious revisions if the consumer is to be assured of the quality of products certified to be organic under the provisions of this bill. At a minimum, adequate residue sampling and testing protocols need to be established to support Sec. 104 (a)(5), as amended above. These standards should include sufficient field and post-harvest sampling of products to guard against problems such as drift and post-harvest line contamination.

"Periodic" testing should be replaced with language specifying an appropriate testing timetable per crop to confirm compliance with all organic standards, including testing of products after the last potential exposure to chemicals.

Sec. 118 (b)(2): Residue Testing — If the Secretary, the applicable governing State official, or the certifying agent determines that an agricultural product labeled as being "organically produced" under this title contains any pesticide or other nonorganic residue in excess of 5 percent of the tolerance level established by the Administrator of the Environmental Protection Agency for that substance in food or 5 percent of the action level for food as established by the Administrator of the Food and Drug Administration, such agricultural product may not be labeled as "organically produced" under this title.

The 5% rule established in this provision is an arbitrary and largely unenforceable attempt to differentiate organic products from commercial products.

On the one hand, it has been estimated that as many as 250 of the 316 pesticides currently registered for use in the U.S. cannot be routinely detected at levels as low as 5% of tolerance. Thus, there will be no way to determine whether products meet the 5% standard or not.

For other pesticides, the 5% rule will not significantly differentiate organic products from other commercial products on the market. For example, the fungicide, Captan, is currently permitted at residue levels as high as 50 ppm on grapes; however, conventional use would likely result in residue levels ranging from 1 to 3 ppm. Applying the 5% rule, Captan residues up to 2.5 ppm would be permitted on organic grapes.

Given the 5% rule, the number of residue violations would be expected to increase dramatically as a result of drift or other accidental contamination. As a result, effective enforcement would require a substantial increase in the amount of "compliance" testing performed by the U.S. Food and Drug Administration and state agencies.

Rather than establish a standard that cannot be verified on the one hand, and on the other hand fails to provide a significant quality assurance differential to consumers over conventional products, **it is recommended that a scientifically verifiable "no detected residue" standard should be adopted.** The "no detected residue" standard, backed by clearly defined laboratory detection levels, eliminates ambiguity and matches certification standards with verification capability. It is realistic, yet still assures that "organic" produce meets the highest verifiable standards. The standard is flexible in that it can be adjusted downward on a pesticide by pesticide basis to reflect improvements in detection capability.

Pg. 14. Line 28. Sec. 104. (a)(8) and Pg. 21. Line 6. Sec 107 (i):

Any program established under this title shall ... protect against conflict of interest as specified under section 107(i) ...

According to the current language of S.2108, "certifying agents" must have "sufficient" experience in organic farming, and their inspectors must have at least five years of experience in organic farming. A likely outcome of the proposed system is that neighbors will certify neighbors, (farmers certifying farmers) and certification will thus be kept "in the family." The provisions of this bill are not adequate to protect against the clear problems associated with such farmer dominated certification.

Serious conflict of interest issues also arise in connection with the composition of the proposed National Organic Assembly, which has been designed to assure majority rule to the producers of organic food. This amounts to asking the fox to guard the henhouse. See further discussion of this point under Title 2.

Pg. 14. Line 22. Sec. 104 (b)(2)(B):

An organic certification program established under this title may provide for the certification of an entire farm or handling operation or specific fields of a farm or parts of a handling operation if, in the case of a handling operation, the part of a handling operation to be certified under this title is adequately separated, as determined by the certifying agent, from other parts of the handling operation that are not organically managed.

This provision is far more problematic than it might at first seem. **Cross contamination on packing lines, for example, is currently a**

widespread problem and difficult to control. Synthetic post-harvest fungicides like Botran stick to packing line surfaces and are nearly impossible to remove even after the most strenuous cleaning efforts. Some shippers have had to construct completely separate packing lines for their organic products to solve the problem.

For example, the State of New York recently found Botran residues in samples of "organic" Earth's Best baby food at levels which violated the state's organic laws. This contamination could easily have occurred accidently on the packing line.

Another example is the problem of residue persistence in the environment. Chlorpropham, commonly known as Sprout Nip, has been known to persist in a storage facility for more than 12 months and result in residues on organic potatoes.

This provision should be rewritten to spell out the steps, including worst-case sampling and testing, that must be taken to ensure that accidental contamination does not take place during the handling of organic products.

Pg. 22, Line 21, Sec. 108 (b) and (c):

Inspectors employed by the certifying agent to inspect organic farming operations under subsection (1) shall be qualified to perform such inspections based on the education and training as determined by the Secretary, and the governing State official (if applicable). Such inspectors should have a minimum of 5 years experience in organic farming or organic production.

Inspectors employed by the certifying agent under subsection (1) to inspect organic handling operations shall be qualified to perform such inspections based on the education and training of such inspectors as determined by the Secretary, and the governing State official (if applicable). Such inspectors should have a minimum of 5 years experience in the organic production of food or in appropriate food industry experience.

Five years of experience in organic farming or production in no way guarantees that an inspector will be adequately trained or knowledgeable to conduct appropriate inspections and/or sampling. Does a field hand who picked grapes for five years qualify? Does a trained entomologist licensed in pest control not qualify?

The qualifications for the job of inspector should be based on proof of adequate scientific and technical background to perform the inspection functions professionally. (See discussion of Sec. 104 (a)(5) and (a)(6) for outline of recommended inspection functions to be performed.) It is therefore recommended that **inspectors should undergo mandatory training, examination and licensure in order to qualify.**

Pg. 23. Line 22. Sec. 109 (b):

To assist the Secretary in evaluating applications under section 106, the Secretary shall establish a panel of not less than 3 persons who have expertise in organic farming and handling methods to evaluate the State or private individual that is seeking accreditation as a certifying agent under such section. Not less than 2 members of such panel shall be individuals who are not employees of the U.S. Department of Agriculture or of the applicable State government.

Just as the inspectors should be required to demonstrate sufficient expertise to carry out their tasks, **certifying agents should be required to undergo licensing procedures.** The concept of establishing a review committee to review the agent's credentials and administer the tests is a good one; however, to protect against potential conflicts of interest, such a committee should explicitly exclude anyone who is actively involved in the production, handling, or marketing of organic produce.

Pg. 25. Line 5. Sec. 110 (e):

To be labeled as an organically produced agricultural product under this title, an agricultural product shall not have been produced on soil or in any growing medium that has been determined by the certifying agent (after appropriate soil testing) to contain levels of chemical residue that are likely to result in unsafe residue levels in any food produced on such soil.

This provision is highly ambiguous in its references to "appropriate soil testing" and to "unsafe residue levels." One agent might consider soil testing unnecessary, while another might require several tests for different soil types.

Given the strict rules governing synthetic pesticides on organic produce, this provision should be redrafted to require testing for all registered pesticides, as well as unregistered pesticides such as DDT which may be expected to linger in the soil from previous use.

To match the provisions of the bill as currently drafted, "unsafe residue levels" should be replaced with language that ensures that products grown in such soil will contain no more than 5% of tolerance level residues. If a "no detected residue" standard is adopted, then any language modifications should reflect this standard.

Pg. 25. Line 24. Sec 111 (a):

The Secretary shall establish a National List of approved and prohibited substances that shall be included in the standards for organic production established under this title in order for such products to be labeled as "organically produced" under this title.

The National List of approved and prohibited substances is a key provision of this legislation, and should be strengthened to explicity prevent the inclusion of any substances which:

a) do not have practical analytical procedures; or

b) are missing vital toxicity information (core toxicological data required under FIFRA).

Most botanical pesticides would automatically fail on both counts.

Without such requirements, this bill will only perpetuate problems that have already been identified by the U.S. Food and Drug Administration, Environmental Protection Agency, and General Accounting Office with respect to the overall pesticide registration system.

Additionally, the bill should explicitly preclude pesticides from being "grandfathered in", that is, permitted for use based on historical use. In other words, **all materials to be used, whether natural or synthetic in origin, should be required to be evaluated by the same health standards and should be testable in the laboratory.**

Pg. 26. Line 5. Sec 111 (b)(1)(a):

Such list shall contain an itemization of specific synthetic substances that may be used in the production and handling of agricultural products labeled as organically produced under this title, even though the use of such substances is prohibited elsewhere in this title.

For years, organic growers have been advertising their products as "free of synthetic pesticides, growth regulators, and fertilizers." The use of synthetic substances in the production of "organic" products directly contradicts the consumer's expectation that such products are produced without such synthetic chemicals.

If exceptions are to be made and synthetic substances, including activators such as piperonyl butoxide, are to be allowed, then users of these substances should no longer be allowed to make the claim "free of synthetic chemicals." When synthetic substances are used on organic products, the producer should be required to disclose a complete listing of the synthetic substances used, to be prominently posted at point of purchase. If, on the other hand, the organic industry wishes to preserve this claim for all organic products, then no synthetic exemptions should be granted.

It should be noted that the statement "free of synthetic pesticides, etc." may also mislead consumers into believing that no pesticides were used, since most consumers are not aware of the existence of organic pesticides such as botanicals. One way to address this problem would be to require the mandatory posting of any pesticide used in the production process, whether natural or synthetic in origin.

The recommendation that the "free of synthetic pesticides" claim be forbidden if any exempted synthetic substances are used is consistent with Sec. 213 (k), which warns that producers "shall not make any false or unwarranted claims on behalf of organiclly produced agricultural products."

It is further recommended that a third paragraph be added to Sec. 111 (b) to ensure that the purity of any botanical or natural pesticide is established before being permitted for use on "organically produced" materials. The supplier of such substances should submit appropriate analytical results demonstrating that the material contains no detected residues of any synthetic pesticide or other non-organic contaminant.

Pg. 27, Line 18, Sec. 111 (2)(A)(i):

The National List may provide for the prohibition of the use of specific natural substances in an organic farming or handling operation that are otherwise permitted under this title only if the Secretary determines that the use of such substances would be harmful to human health or the environment ...

This provision makes an inappropriate presumption of safety for naturally-derived substances such as pesticides. Instead, all inputs, natural or synthetic, should be treated alike. The minimum core tox health studies normally required of synthetic pesticides under FIFRA should be required as a prerequisite for approval for all natural substances.

In addition, if evidence of environmental toxicity is presented for a specific natural substance, the burden of proof should lie with the manufacturer or supplier of that substance to prove its environmental safety before being permitted. For example, Rotenone is a widely recognized fish poison used by Fish and Game Departments to kill fish for the purposes of restocking lakes. This substance is clearly an environmental hazard, and should not be approved. See attachments for more information.

Pg. 29, Line 14, Sec. 112:

Prohibited Crop Production Practices and Materials

As currently drafted, any of the prohibited crop production practices and materials listed in this entire section may be exempted under the provisions of Sec. 111. Such ambiguity can only increase consumer confusion.

Pg. 30. Line 7. Sec. 112 (a)(2):

A producer may use specific synthetic-pesticide-treated-seed on such farm under paragraph (1) prior to January 1, 1995, if such specific use is authorized under the applicable State organic certification program.

Consistent with the recommendations listed above with reference to Sec. 111 (b)(1)(A), any organic producer wishing to use synthetic-pesticide-treated seedstock should be required to provide a full disclosure of the synthetic pesticides used and ensure that this list is posted at point-of-purchase.

Pg. 30. Line 18. Sec. 112 (c)(6):

For a farm to be certified under this title, producers on such farm shall not ... use any synthetic growth promoters or synthetic growth regulators.

The use of growth promoters and growth regulators is a subject that deserves far more attention than it has been granted. As a rule, growth promoters and hormones are used strictly to promote growth, improve appearance, or provide some other cosmetic enhancement. The justification for the use of such materials on products considered to be "natural" by consumers is marginal.

At a minimum, any natural hormone or growth regulator used on an organic product should have adequate health data, and should be testable. Gibberilic acid, a growth hormone used widely in the grape industry, is an example of a hormone which can be obtained from natural sources and can be tested.

It is not always possible to distinguish supplemental hormones from naturally occuring hormones, and natural hormone levels may actually exceed the levels resulting from supplemental use. Natural estrogen levels in a pregnant heifer, for example, can reach levels 2600 times greater than the levels found in a castrated steer implanted with estrogen.

Pg. 32. Line 5. Sec. 112:

Weed Control

In the search for alternatives to traditional synthetic herbicides, new botanical herbicides are being developed which take advantage of the *allelopathic* properties of some plants, i.e., the natural ability of some plants to produce chemicals which inhibit the growth of other plants. Despite evidence of natural toxicity, these new herbicides lack minimum health data. Such natural herbicides should be subjected to the same minimum standards recommended elsewhere in this document.

Pg. 33, Line 23, Sec. 113 (e):

Manuring

No provisions are currently included to ensure that manures are not contaminated by drugs, antibiotics, pesticides, or hormones. Contaminated manure has been reported to be extremely phytotoxic (i.e., killing every plant in direct contact), and additionally may contain residue which leachate back into the soil and into the plant itself.

It is recommended therefore that all manures be required to be certified to be free of these materials, including independent testing, before being permitted for use.

Pg. 35 - 36; Line 2, Sec. 114 (a):

(1)(B): *"With respect to any meat, poultry, wild or domesticated game, or other nonplant life that is tc be slaughtered and sold as "organically produced" prior to January 1, 1995, such livestock shall be raised in accordance with this title for a minimum of the final 60 percent of the slaughter weight of such livestock."*

(2)(B): *"Any poultry from which eggs will be labeled "organically produced" prior to January 1, 1995, shall be managed in accordance with this subsection for not less than a 4-month period prior to the sale of such eggs and during the period in which such eggs are sold."*

(3)(B): *"Any dairy cow from which milk and milk products will be labeled "organically produced" prior to January 1, 1995, shall be raised in accordance with this title for not less than a 12- month period prior to the sale of such milk and continuously thereafter."*

Each of these exceptions makes it possible for an animal to be treated in a manner which is wholly inconsistent with the concept and spirit of organic (i.e., no synthetic chemicals) for a significant portion of its life. Not only will consumers be misled by the "organic" labelling of such products, but producers of conventional beef, poultry, and other animal products may face unfair competition from producers who are not producing a substantially different or safer product.

It is therefore recommended that these transitional labelling periods be dropped from the bill.

Pg. 37, Line 18, Sec. 114 (d)(1)(D) and (E):

For a farm that produces livestock to be organically certified under this title, producers on such farm shall not administer medication other than vaccinations in the absence of illness as diagnosed by a veterinarian; or administer any vaccinations other than forward of the shoulder area.

These provisions offer producers a virtually unrestricted loophole in the prohibition against the use of antibiotics or other medication. What this loophole points to is a much larger issue that should be addressed within the entire Animal Production Practices and Materials section 114 — the sanction of animal production practices which promote the spread of disease.

To meet the consumer's expectation that "organically produced" animal products differ significantly from other animal products on the market, "factory farming" of such livestock or dairystock should be prohibited. Such animals should be raised only in environments which provide a reasonably normal habitat for the animal.

Pg. 38, Line 12, Sec. 114 (e)(1):

A certifying agent may require, in order for a farm to be organically certified under this title, that producers on such farm submit for analysis any water to be made available for livestock covered by this title for the purpose of determining the quality, salinity, and purity of such water and the presence of pesticides and nitrates in such water.

This provision leaves water analysis to the discretion of the certifying agent, who may have no way to determine if the water table or water source has been contaminated by previous land use or upstream land uses. The provision is far too ambiguous, establishing no parameters for monitoring toxic plumes or chemicals which are not easily analyzed or are too costly to analyze on a purely guesswork basis.

Title 2

Pg. 57, Line 1, Sec. 205(c)(1) and (c)(3)(C):

The Secretary shall appoint individuals to serve on the Delegate Body from among nominations received in accordance with this subsection.... The Secretary shall only accept nominations for membership in the Delegate Body from a nominating State official, or by written petition signed by 20 organic producers in a State.

Not less than 50 percent of the membership of the Delegate Body shall consist of individuals who (i) are involved in the production and handling of organically produced agricultural products; and (ii) have derived at least 75 percent of the food-related business income and at least 50 percent of the total income of such individuals from food sold as organic or natural for not less than a 3-year period preceding the appointment of such individuals to the Delegate Body.

S.2108 was clearly drafted from the perspective that the producers and handlers of organic products should dominate all aspects of the organic certification process, starting with the composition of the Initial National Organic Delegate Body (INODB) and including every other major aspect of the program. This arrangement presents **clear conflict of interest concerns**. For example:

1. The producer-controlled Delegate Body is responsible for

   a) electing 15 of its own members to three year terms on the Initial National Organic Board *(Sec. 206 (a)(1)(B))*; and
   b) appointing 15 individuals to the Initial Organic Standards Board *(Sec. 206 (a)(1)(C))*.

2. The National Organic Assembly, designed to succeed the Delegate Body, will be selected by a national election in which only organic producers and handlers are eligible to vote. *(Sec. 210. (b)(3))*

3. The Assembly, in turn, will choose 15 successors to the National Organic Board and appoint 15 successors to the Organic Standards Board. *(Sec. 211 (a)(2) and (a)(3))*

4. Simple majority votes in the Delegate Body and Assembly will constitute a quorum. *(Sec. 205 (f) and Sec. 210 (j))* Again, these bodies guarantee 50% or more of their seats to organic producers and handlers. *(Sec. 205 (c)(3)(C) and Sec. 210 (c)(5)A))*

5. Among other duties, the National Organic Board, which is explicitly structured to have a producer majority, will be responsible for "receiving, investigating and reporting to the Secretary accounts of any violations..." *(Sec. 212 (d)(4))*

One of the most troubling conflict of interest issues arises over the procedures for determining which agricultural inputs, such as pesticides and fertilizers, will be permitted for use.

The Initial Organic Standards Board, followed by the permanent Organic Standards Board, is responsible for determining which materials will be approved and which materials will be prohibited, applying a risk/benefit analysis which fails to specify when risks should outweigh benefits:

Sec. 215 (e) — In evaluating substances considered for inclusion in the Proposed National List or proposed amendments to the National List, the Organic Standards Board shall determine —

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

(3) the probability of environmental contamination during manufacture, use, or misuse of such substance;

(4) the effects of the substance on human health;

(5) the effects of the material on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including consideration of salt index and solubility), crops, and livestock;

(6) the alternatives to using the substance in terms of practices or other available materials; and

(7) its compatibility with a system of sustainable agriculture.

Criteria (6) and (7) give producers the loopholes necessary to include any materials which they deem necessary for or compatible with the production of organic foods. In practice, such loopholes have been used to allow substances which lacked clear evidence of non-toxicity to human health or the environment (e.g., Rotenone) as well as synthetic materials (e.g. the pyrethrum activator, piperonyl butoxide).

Under the present legislation, the standards board must decide whether the benefits of using a particular substance outweigh the health risks associated with it. While grower input is clearly important, a grower-appointed board cannot be expected to have an unbiased view.

In addition, the whole concept of "risk/benefit" analysis should be reexamined before being adopted by this legislation. Risk/benefit analysis may serve a valid function in the registration of pesticides for broad agricultural use. But does this type of analysis really belong in an organic system designed specifically to assure the consumer that products meet quality standards more stringent than the average product? Quite simply, the consumer pays more for organic food because he or she believes that risks to health and the environment are reduced. It follows, therefore, risks should be weighed far more heavily, and that clearly stated safety guidelines should be established to preempt any consideration of "benefits".

Title 3

Pg. 103, Line 5, Sec. 302 (b):

The purpose of the Program is

(1) to recognize that many farmers have substantially reduced the use of chemical inputs and have adopted sustainable methods of farming;

(2) to authorize the establishment of a grant program for States to explore the ramifications of establishing a low input label for agricultural products produced using low input sustainable agriculture methods of production ....

The transition away from heavy reliance on chemical inputs is certainly a trend worth noting. Rising concerns over food safety and the environment have led more and more farmers to develop "low input" and "integrated pest management" agricultural practices.

Unfortunately, these terms have been defined in only the loosest terms, and farmers using these terms may be referring to substantially different agricultural practices. For example, many "low input" programs emphasize reduced tillage, which often results in *increased* use of herbicides. Other "low input" farmers are using fewer pesticide applications, but *more highly toxic* concentrations.

It is therefore imperative that any labelling program for "low input sustainable agriculture" (LISA) provide clear, scientifically verifiable standards by which to judge such claims. The current legislation contains no definitions or standards whatsoever, yet proposes to allow different states to implement labelling programs to evaluate consumer reaction. This reasoning puts the cart before the horse.

As is the case with organic labelling, LISA labelling of products conveys added value to the consumer, in terms of reduced toxic burden to the environment, to humans, or both. Under some interpretations of LISA, practically all food produced in the U.S. could qualify, without resulting in any significant reductions in pesticide usage or pesticide residues. Until LISA can be adequately defined in scientific terms, and appropriate certification protocols can be established, we believe it is premature to institute a labelling program.

At a minimum, it is recommended that LISA certification principles be patterned after the recommended modifications to the organic certification process discussed in this report under Title 1, including detailed field and packing line inspections, field sampling, and the adoption of a "no detected residue" requirement.

At the same time, this area of claims is potentially a very important option for producers and the public. As such, it deserves more careful consideration, perhaps in a separate piece of legislation, with adequate opportunity for comment from the researchers, agriculturists, and the community at large.

Title 4

Pg. 108, Line 19, Sec. 403 (a):

The Secretary shall establish a National Laboratory Accreditation Program under which laboratories that conduct residue testing of agricultural products under this Act or that make claims to the public or buyers of agricultural products concerning chemical residue levels on agricultural products shall be determined to meet certain minimum quality and reliability standards.

As the nation's leading promoter of American agricultural products, the Secretary of Agriculture should not then also be asked to be responsible for regulating the laboratories that will monitor agricultural claims. The certification of laboratories should fall under the administration of a separate agency which has no role in the promotion of products to be tested.

As the agency responsible for the regulation of claims on most foods and drugs, and specifically responsible for the regulation of pesticide residues in fresh fruits and vegetables, it would seem that the Food and Drug Administration, rather than the Department of Agriculture, would be the appropriate agency to enforce a laboratory accreditation program.

Pg. 109, Line 1, Sec., 403 (b)(1):

In order to be accredited under this title, a laboratory shall ... prepare and submit an application for accreditation to the Secretary ...

Clear timetables should be established in any accreditation legislation to ensure the timely processing of any applications.

Pg. 111, Line 7, Sec. 404 (c)(2):

The Secretary may issue certificates of interim accreditation to laboratories that the Secretary determines are likely to successfully meet all requirements for full accreditation...

Here and in other sections of the title, the Secretary of Agriculture is granted discretionary authority to decide the accreditation status of a given laboratory.

Accreditation procedures must remain unbiased. Discretionary authority to grant or withhold accreditation should be replaced with language that clearly specifies the causes of approval or disapproval on scientific grounds. Accreditation should be based strictly on performance.

* * * * *

In conclusion, it is recommended that the laboratory accreditation portion of this legislation be stricken until some of the complexities of accreditation can be ironed out:

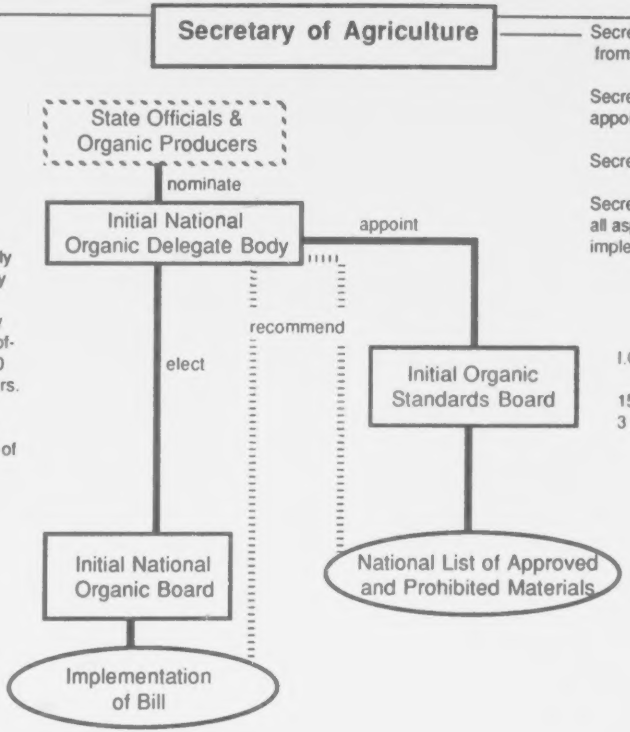
1) Practical analytical procedures do not currently exist for many of the botanical pesticides which could be permitted under this legislation. Should laboratory accreditation ignore this problem?

2) Current laboratory detection capabilities in food are not adequate to provide reliable detection down to 5% of tolerance for most pesticides in food (see attachment). Can laboratories be accredited if held to such a standard? If 5% cannot be achieved, what standard would be considered acceptable?

3) More than half of the synthetic pesticides in use require complicated single residue analysis. Which of these single residue tests should a laboratory be required to perform to demonstrate competence? And to what detection levels?

These are just three issues of many that must be resolved before a credible accreditation program can be implemented. A technical committee comprised of professional laboratory associations, major research and food testing laboratories, and appropriate government agencies such as the Food and Drug Administration and Office of Technology Assessment should be assembled to begin addressing these questions.

Board Membership as Defined in Title 2
Preliminary Stage: 1st 3 years


Secretary of Agriculture
State Officials &
Organic Producers
nominate
Initial National
Organic Delegate Body
appoint
recommend
elect
Initial Organic
Standards Board
Initial National
Organic Board
National List of Approved
and Prohibited Materials
Implementation
of Bill

Secretary appoints I.N.O.D.B. from nominations

Secretary approves I.N.O.D.B appointments to I.O.S.B.

Secretary approves National List

Secretary has final authority over all aspects of program implementation.

I.N.O.D.B.:

Up to 208 delegates;
3 year term; one-time only
Quorum = simple majority

Nominations to this body are to be made by state officials or petitions from 20 or more organic producers.

Producers/handlers are guaranteed at least 50% of the seats.

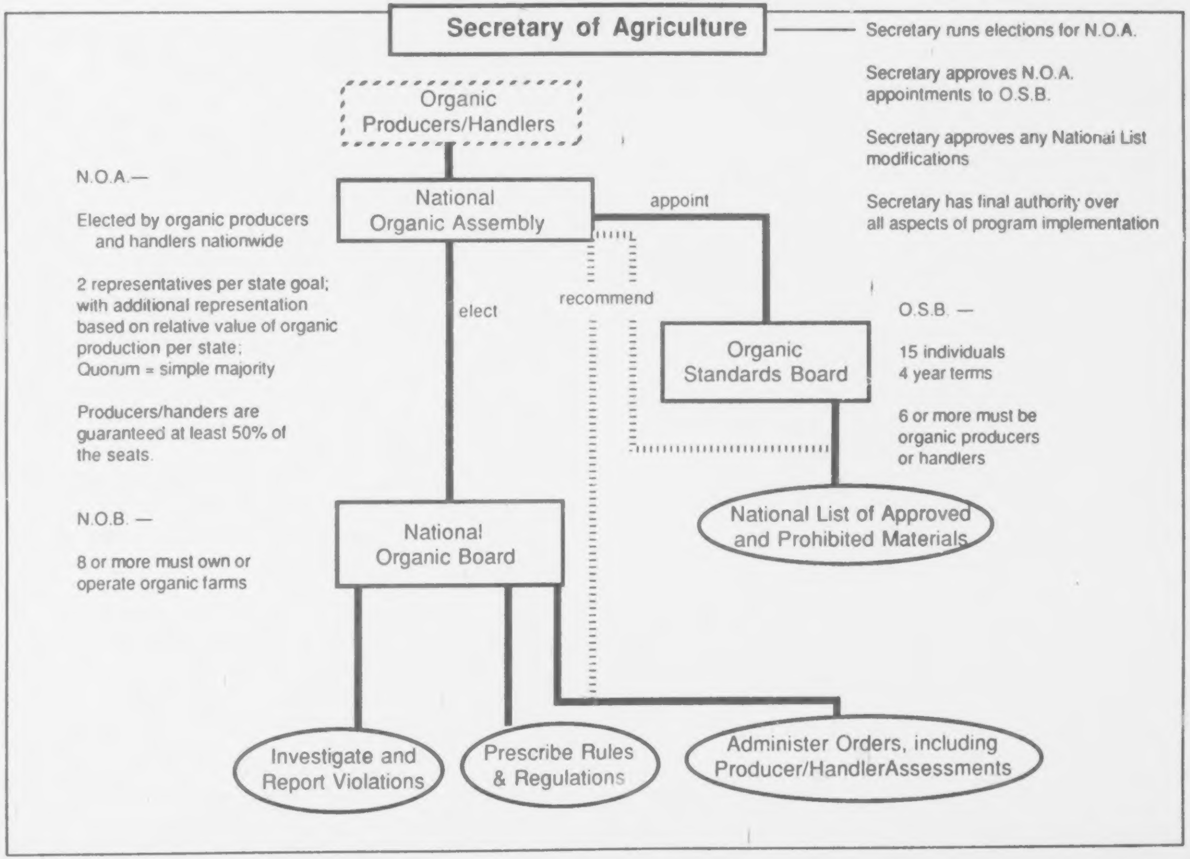
I.N.O.B:

15 members of INODB
3 year terms

I.O.S.B.:

15 individuals
3 year terms

Board Membership as Defined in Title 2
Beyond First 3 Years


Secretary of Agriculture
Organic Producers/Handlers
National Organic Assembly
appoint
recommend
elect
Organic Standards Board
National Organic Board
National List of Approved and Prohibited Materials
Investigate and Report Violations
Prescribe Rules & Regulations
Administer Orders, including Producer/HandlerAssessments

Secretary runs elections for N.O.A.

Secretary approves N.O.A. appointments to O.S.B.

Secretary approves any National List modifications

Secretary has final authority over all aspects of program implementation

N.O.A.—

Elected by organic producers and handlers nationwide

2 representatives per state goal; with additional representation based on relative value of organic production per state;
Quorum = simple majority

Producers/handers are guaranteed at least 50% of the seats.

N.O.B. —

8 or more must own or operate organic farms

O.S.B. —

15 individuals
4 year terms

6 or more must be organic producers or handlers

Evaluating the Impact of the 5% Tolerance Rule on Enforcement for 28 Cancer-Causing Pesticides Reviewed in the 1987 NAS Report

Pesticide/ Detection Limit	Apple	Orange	Lettuce	Tomato	Potato	Peach	Grape	Carrot	Corn
Linuron 0.05-0.20 ppm					▨ 1.0 0.05			▨ 1.0 0.05	0.25 0.0125
Zineb 0.10-0.20 ppm	▨ 2.0* 0.10	▨ 7.0 0.35	▨ 10.0 0.50	▨ 4.0 0.20		▨ 7.0 0.35	▨ 7.0 0.35	▨ 7.0 0.35	▨ 5.0 0.25
Captafol 0.05-0.10 ppm	0.25 0.0125	0.50 0.025		▨ 15.0 0.75	0.50 0.025	▨ 30.0 1.50			0.10 0.005
Captan 0.05-0.20 ppm	▨ 25.0 1.25	▨ 25.0 1.25	▨ 100.0 5.0	▨ 25.0 1.25	▨ 25.0 1.25	▨ 50.0 2.5	▨ 50.0 2.5	▨ 2.0 0.10	▨ 2.0 0.10
Maneb 0.10-0.20 ppm	▨ 2.0 0.10		▨ 10.0 0.50	▨ 4.0 0.20	0.10 0.005	▨ 10.0 0.50	▨ 7.0 0.35	▨ 7.0 0.35	▨ 5.0 0.25
Permethrin 0.05 ppm	0.05 0.0025		▨ 20.0 1.0	▨ 2.0 0.10	0.05 0.0025	▨ 5.0 0.25			0.10 0.005
Mancozeb 0.10-0.20 ppm	▨ 7.0 0.35			▨ 4.0 0.20	0.50 0.025		▨ 7.0 0.35	▨ 7.0 0.35	0.50 0.025
Folpet 0.05-0.10 ppm	▨ 25.0 1.25	▨ 15.0 0.75	▨ 50.0 2.5	▨ 25.0 1.25			▨ 25.0 1.25		
Chlordimeform 0.10 ppm									
Chlorothalonil 0.05-0.10 ppm				▨ 5.0 0.25	0.10 0.005	0.50 0.025		▨ 1.0 0.05	▨ 1.0 0.05
Metiram 0.10-0.20 ppm	▨ 2.0 0.10			▨ 4.0 0.20	0.50 0.025				
Benomyl 0.05-0.20 ppm	▨ 7.0 0.35	▨ 10.0 0.50		▨ 5.0 0.25		▨ 15.0 0.75	▨ 10.0 0.50	0.20 0.010	0.20 0.010
O-Phenylphenol 0.05-3.0 ppm	▨ 25.0 1.25	▨ 10.0 0.50		▨ 10.0 0.50		▨ 20.0 1.0		▨ 20.0 1.0	
Acephate 0.05-0.10 ppm			▨ 10.0 0.50						
Alachlor 0.10-0.20 ppm					0.10 0.005				
Parathion 0.05-0.10 ppm	▨ 1.0 0.05	▨ 1.0 0.05	▨ 1.0 0.05	▨ 1.0 0.05	0.10 0.005	▨ 1.0 0.05	▨ 1.0 0.05	▨ 1.0 0.05	▨ 1.0 0.05
Oxadiazon 0.01-0.10 ppm						0.05 0.0025			
Oryzalin 0.01-0.05 ppm	0.05 0.0025	0.05 0.0025			0.05 0.0025	0.05 0.0025	0.05 0.0025		
Pronamide 0.04-0.10 ppm	0.10 0.005		▨ 1.0 0.05			0.10 0.005	0.10 0.005		
Cypermethrin 0.10-0.20 ppm			▨ 10.0 0.50						
Ethalfluralin 0.05-0.10 ppm									
Diclofop methyl 0.05 ppm									
Metolachlor 0.01-0.05 ppm					▨ 0.20 0.01	0.10 0.005			0.10 0.005
Cyromazine 0.05-0.10 ppm			▨ 5.0 0.25						
Terbutryn 0.10 ppm									
Glyphosate 0.05-0.20 ppm	0.10 0.005	0.10 0.005	0.10 0.005	0.50 0.025	0.10 0.005	0.10 0.005	0.20 0.010	0.10 0.005	0.10 0.005
Fosetyl Al 0.05-0.10 ppm		0.10 0.005							
Azinphos-methyl 0.05-2.0 ppm	▨ 2.0 0.10	▨ 2.0 0.10		▨ 2.0 0.10	0.30 0.015	▨ 2.0 0.10	▨ 5.0 0.25		

*In each box, FIFRA levels are listed above, 5% FIFRA are listed below. All values are in parts per million (ppm).

▨ 5% tolerance is equal to or exceeds detection level.

☐ 5% tolerance is less than detection level.

Pesticide/ Detection Limit	Apple	Orange	Lettuce	Tomato	Potato	Peach	Grape	Carrot	Corn
CAPTAN 100%: 5%:	25.0 1.25	25.0 1.25	100.0 5.0	25.0 1.25	25.0 1.25	50.0 2.5	50.0 2.5	2.0 0.10	2.0 0.10

Conventional Apple vs. Organic Apple

Comparison of Pesticide Applications in the Field

Washington State Organic Apple		Washington State Conventional Apple	
Pesticide	# of field applications	Pesticide	# of field applications
Sabadilla	at least once	Parathion	once
Pyrellin	at least once	Bayleton	once
Cryolite	at least once	Thiodan	once
Ryania & Fish Oil	12 to 14 times	Guthion	3 times

Based on Recommendations from IFM, a leading organic supplier of organic products

Based on actual pesticide disclosure from typical Washington state grower

Botanical Pesticides:
Literature Review

Introduction

A survey of scientific literature was conducted to determine the toxicity of selected botanical pesticides. The findings of this survey are reported below.

It is important to note that most of the scientific studies conducted on the subject of botanical pesticides are several decades old. Researchers seeking to add to this base of knowledge through the use of modern analytical technologies have been frustrated by insufficient funding and interest. Due to the structural complexity of these compounds, there are very few practical analytical procedures available for the determination of botanical pesticide residues.

In the absence of hard scientific facts, speculation has become the conventional wisdom, and the general assumption that "natural" products are safe underlies much of what is written in the popular trade and consumer press. However, such assumptions run counter to the facts that have actually been established. The scientific literature available thus far indicates that the environmental and health impacts of botanical pesticides are analogous in many cases to those effects attributed to synthetic pesticides. When further studies are undertaken, it is predicted that additional toxicological concerns will be raised.

In short, there is no compelling data available to suggest that botanical pesticides should be treated in a substantially different manner than synthetic pesticides. Likewise, food crops produced with such pesticides should not receive substantially different treatment than foods produced with commercial synthetic pesticides.

Copies of all reference materials cited in this document are available.

Pyrethrum

I. Definitions

A. Pyrethrum Source: Flower of the *Chrysanthemum cinerariaefolium* So far, Pyrethrum has been identified in at least two of the 200 species of Chrysanthemum *(C. cinerarifolium Vis. and C. roseum Adam).*

B. Pyrethrum: The dried, ground chrysanthemum flowers which are used as an insecticide.

C. Pyrethrin Family: Six esters (i.e., specific chemical group) comprised of complex alcohols and acids, including Pyrethrin I, Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, Cinerin II.

D. Pyrethroids: Semisynthetic and fully synthetic derivatives of natural pyrethrins, usually esters of chrysanthemic monoor dicarboxylic acid (e.g., allethrin, barthrin, cyclethrin, dimethrin, permethrin, cypermethrin, fenvalerate).

II. Uses

A. Pyrethrum was first used commercially in 1914.[1] It is currently used as a crop spray to control a variety of beetles, worms, leaf hoppers, vinegar flies, fruit flies, white flies, the plume moth, diamond moth larvae, and leaf tiers.[2]

B. Commonly used in household, garden, and livestock sprays; available as a concentrated extract and in dust form.

C. Historically, Pyrethrum has also been used dermally by humans to control bacteria, insects and other parasites, such as scabies and intestinal helmiinthiaisis.[3]

III. Toxicity

A. Known Facts

1. Oral LD50 for Pyrethrin I: 260 mg to 420 mg/kg in rats.
   Oral LD50 for Pyrethrin II: 260 mg to 600 mg/kg in rats.[4]
   (Relatively low doses caused death in 50% of rats exposed)

2. Oral Toxic Dose Level (TDL) for humans: 1g to 2g/ kg (fatal) (inferred from data on rats and guinea pigs)
   Actual death of 2 year old child attributed to 15g of Pyrethrum concentrate[5]

3. In general, the semisynthetic derivatives of natural pyrethrins are less toxic to mammals than the natural

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[1] CRC Handbook of Natural Pesticides: Methods, pg. 4

[2] Whitmore PT 565 Pyrethrum label, 1983.

[3] Hayes, Wayland J. Jr. , Toxicology of Pesticides, 1975 (The Williams and Wilkins Co., Baltimore, MD)

[4] Casida et. al, 1971

[5] Gosselin, R.E., Smith, R.P., and Hodge, Clinical Toxicology of Commercial Products, 5th edition, 1984 (Williams and Wilkins Publ., Baltimore, MD), p. III-352.

pyrethrins.[6]

4. Core Tox Data for Pyrethrin I is incomplete:
   Preliminary Limiting Dose (PLD) = 1,000
   Allowable Daily Intake (ADI) has not yet been established[7]

5. Pyrethrins are unstable (i.e., degrade rapidly) in the environment because of their sensitivity to light and air. Pyrethrins are insoluble in water but decompose rapidly in the presence of mild acid and alkali (e.g., soil). By comparison, pyrethroids are considered to be more stable in the environment (i.e., degrade more slowly).[8]

6. Many popular formulations of Pyrethrum frequently contain synergists such as piperonyl butoxide and sesamex. Such synergists are considered "necessary to produce a good kill at an economical level."[9]

7. Insects must be sprayed directly for the chemical to work, and insects will revive completely if they don't receive a lethal dose. Lab studies indicate evidence of rapid metabolic detoxication.[10]

8. Pyrethrum and pyrethroids act as central nervous stimulants and can induce convulsions. Large doses in gerbils have caused hyperglycemia, reduced glucose tolerance, and a reduction in serum proteins.[11]

B. Areas of Ambiguity

1. No Core Tox Data is available for Pyrethrin II, Jasmolin I, Jasmolin II, Cinerin I, or Cinerin II.[12]

2. Pyrethrin I is often cited as the ester responsible for the insecticidal properties of Pyrethrum, and as the most toxic. However, given the lack of toxicity data for the Jasmolin and and Cinerin esters, the relative toxicity remains ambiguous.

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[6] Ibid, p. III-353.

[7] Environmental Protection Agency, "Reference Dose Tracking Report," April, 1989.

[8] Gosselin, p. III-352.

[9], [10] Ibid.; also, 1990 Farm Chemicals Handbook, p. C245.

[11] Miyamoto et. al., 1971.; Karel and Saxena, 1975. (Bibliography chapter, Gosselin)

[12] EPA, Reference Dose Tracking Report, 1989.

3. There is no established reentry period for Pyrethrum after spraying, despite the fact that it is suggested that areas to be sprayed be vacated until the compound is dry.

4. Because there are no practical methods for testing the majority of Pyrethrin esters or their metabolites, references to the rate of natural Pyrethrin degradation in the environment are not well documented.

5. Likewise, because of the difficulty in analyzing natural Pyrethrins, the majority of knowledge concerning the structure, chemical action, and degradation is derived by inference from synthetic pyrethroids.[13]

6. Although the literature does not list Pyrethrum as being dermally toxic to laboratory animals, skin contact and inhalation may lead to allergic reactions in some individuals, and cases of severe dermatitis, asthma, vasomotor rhnitis, and anaphylactoid reactions have been recorded.

7. The Farm Chemicals Handbook recommends that Pyrethrum not be used near water supplies, and some organic publications have suggested that Pyrethrum is toxic to fish.

8. Permethrin and Cypermethrin, both pyrethroids, are listed as a C carcinogen by the Environmental Protection Agency, but the cancer causing potential of natural Pyrethrum is undetermined.

9. While literature references published in the 1960s refer to Pyrethrum concentrations in insecticidal sprays at approximately 1-2%, recent label information indicates active Pyrethrin concentrations at levels of 6% (PT 565 Pyrethrum).

IV. Analytical Procedures

A. PAM II (Pesticide Analytical Manual, Volume II) procedures exist *only* for Pyrethrin I and Pyrethrin II.

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[13] Matsui and Yamamoto, 1968.

Ryania

I. Definitions

A. Ryania source: *Ryania speciosa*. Ryania is made by grinding up the stems of this tropical South American shrub.

B. Ryanodine: an alkaloid isolated from the root of *Ryania speciosa;* apparently responsible for the lethality of Ryania in insects and mammals.

II. Uses

A. Ryania has been used to kill the European corn borer, codling moth, and cranberry fruit worm. In combination with other materials, it has been shown to be effective on a broader range of pests.

III. Toxicity

A. Known Facts

1. Acute oral LD50 in rats: 1200 mg/kg
   Acute oral LD50 in dogs: 150 mg/kg
   Acute oral LD50 in monkeys: 400 mg/kg
   Acute oral LD50 in rabbits and mice: 650 mg/kg
   Acute oral LD50 in guinea pigs: 2500 mg/kg
   Acute oral LD50 in chickens: greater than 3,000 mg/kg. [14]

2. Ryania is a contact and stomach poison.[15]

3. Ryania has been shown to be less dangerous on a cumulative basis to laboratory animals than DDT.[16]

4. Ryanodine causes the following toxic reactions in mammals: vomiting, weakness, diarrhea, slow deep breathing, and profuse salivation, followed by increased rigidity of striated muscles, depression of the central nervous system, and coma. Death is due to respiratory failure secondary to contracture of the respiratory muscles.[17]

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[14] Kuna, Samuel and Heal, Ralph E., "Toxicological and Pharmacological Studies on the Powdered Stem of Ryania Speciosa, A Plant Insecticide," The Merck Institute of Therapeutic Research and the Merck Research Laboratories, Rahway, N.J., 1948.

[15] IFM, 1989 Products Guide Manual

[16, 17] Kuna et. al.

5. According to some organic references, Ryania breaks down more slowly in the environment than Rotenone, which therefore increases the possibility that residues will remain on crops.[18]

6. According to the organic products journal, IFM, Ryania is sometimes systemic in the juices of treated plants.

B. Areas of Ambiguity

1. There is no Core Tox data currently available for Ryania.[19]

IV. Analytical Procedures

A. There is currently no practical analytical method listed in the FDA PAM II guidelines for testing Ryania.

* * *

Sabadilla

I. Definitions

A. Sabadilla source: *Schoenocaulon officinale* (also known as *Veratrum Sabadilla*). Sabadilla is derived from the dried ripe seeds of this plant, which is a member of the lily family. There are numerous complex alkaloids, including more than 30 of which have been isolated. These 30 alkaloids are of the Ceveratrum group.

II. Uses

A. Sabadilla is used as an insecticide against citrus thrip, lice, leaf hoppers, squash bugs, striped cucumber beetles, stink bugs, and lygus bugs.

III. Toxicity

A. Known Facts

1. Oral LD50: 2,000 - 5,000 mg/kg in rats
Oral LD50: 4,000 mg/kg rabbits.[20]

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[18] Garbage Magazine, September/October 1989, p. 45.

[19] EPA Reference Dose Tracking Report, April 1989.

[20] Sax et.al., 1984; University of California, 1979.

2. Veratrum sabadilla alkaloids are highly toxic to mammals (including humans) as well as insects.[21]

3. Organic products manuals list Sabadilla as being "quite toxic to fish and mammals." [22]

B. Areas of Ambiguity

1. There is no Core Tox data currently available for Sabadilla.[23]

2. Although it is assumed that Sabadilla is specific to the target pest and does not harm beneficials, researchers have admitted that lack of residue testing procedures makes it difficult to confirm this conclusion. Studies in this area have looked only at mortality, not at morbidity, for the three beneficial insects studied.[24]

3. In the IFM manual, the authors state that "the producers claim that, unlike most botanicals, Sabadilla [actually] increases in potency in storage." This statement suggests that the degradation products of Sabadilla may be even more potent than Sabadilla itself, though there have been no firm studies to prove this.

IV. Analytical Procedures

A. There is currently no practical analytical method listed within the FDA PAM II guidelines for testing Sabadilla. "Because of the large number of hydroxyl groups and high molecular weight, ceveratrum alkaloids cannot be easily analyzed by GC. On the other hand, their lack of a strong UV chromophore makes them unsuitable for determination by HPLC with UV absorption."[25]

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[21] CRC Handbook, p. 10)

[22] IFM

[23] EPA Reference Dose Tracking Report

[24] Bellows et.al., *Journal of Entomology*, University of California, Riverside, 1979.

[25] CRC Handbook, p. 10.

Rotenone

I. Definitions

A. Rotenone source: *Derris* and *Lonchocarpus* roots cultivated in Malaya, the East Indies and in Latin America.

B. Rotenoids: alternative poisons derived from the same plants as Rotenone, but not as effective as insecticides.

II. Uses

A. Rotenone has been used widely as a fish poison.

B. Historical non-food uses of Rotenone have included the poisoning of arrow heads, treatments for chiggers and scabies, and suicide.

III. Toxicity

A. Known Facts

1. Some synthetic derivatives of Rotenone have been developed, including dihydrorotenone, isorotenone, and dehydrorotenone. Although some of these compounds have been shown to be more effective against certain insects, and less toxic to humans, than Rotenone, they are not in common use.[26]

2. Some metabolites of Rotenone identified in mice have been shown to have similar toxicity to Rotenone.[27]

3. Rotenone is a central nervous system poison, and is considered to be more toxic than pyrethrins. Its toxicity has been compared to that of DDT.[28]

4. Rotenone is highly toxic to birds, particularly nestlings.[29]

5. Among mammals, Rotenone has been found to be most lethal to guinea pigs. Several studies have shown Rotenone to cause tumors in rats, including Lehman (1952) and the National Toxicology Program (1986). Other feeding

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[26] Gosselin, p. III-366-367.

[27, 28] Ibid.

[29] Cutkomp, L.K., "Toxicity of Rotenone and Derris Extract Administered Orally to Birds," 1942 (Dept. of Entomology, Cornell University)

experiments have yielded no evidence of pathology.[30]

6. In humans, Rotenone has been known to cause "spindle poisoning," interfering with the formation of mitotic or miotic spindles in the brain at concentrations of $1x10^{-7}$ M to $1x10^{-5}$ M. This finding has especially important ramifications for children, whose nervous system is not fully developed.[31]

7. Rotenone has also been found to block NAD-flavin electron transport (similar to barbiturates), a condition which can only be treated with the Vitamin K_3.[32]

8. Symptoms in humans and animals, after ingestion or injection, include nausea, vomiting, tremors, incoordination, convulsions, respiratory depression and/or failure, and death.

B. Areas of Ambiguity

1. Core Tox Data for Rotenone is incomplete. A preliminary allowable daily intake level (PADI) has been set at 100.[33]

IV. Analytical Procedures

A. There is presently no practical analytical method listed within the FDA PAM II guidlines for Rotenone.

Nicotine

I. Definitions

A. Nicotine source: *Nicotiana.* There are 66 known species of *Nicotiana*, 52 of which are known to produce nicotine alkaloids. *Nicotiana Rustica* contains approximately 18% nicotine, compared to *Nicotiana Tabaccum* , which contains approximately 0.1 - 6.3% nicotine. Nicotine is extracted for insecticidal purposes from both of these plants, with concentrations ranging from 0.5% to 8% depending on the presence of citric or malic acids.

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[30] "Technical Report on Rotenone," by the National Toxicology Program, 1986.

[31] Hayes, Wayland, J., Jr. Toxicology of Pesticides, 1975 (The Williams and Wilkins Co., Baltimore, MD)

[32] Ibid.

[33] EPA Reference Dose Tracking Report

II. Uses

A. Although Nicotine was widely used in dust or powder form in the 18th century, its use has dwindled in this century. During its popular use in the 1920s and 30s, fatal poisonings were reported to occur frequently.

III. Toxicity

A. Known Facts

1. Nicotine is highly toxic to humans. It passes readily through the blood brain barrier and placental barrier, easily reaching the brain to react with nicotinic receptors. The adult lethal dose ranges from 30 to 60 mg (0.5 - 1.0 mg/kg). In several cases, infant deaths have been attributed to the contamination of formula by tobacco.[34]

2. Oral LD 50 for dogs is 10 mg/kg.[35]

3. Analysis of commercial formulations of nicotine conducted at the University of California Gill Tract Agricultural Station have shown that 14 of the 52 nicotine alkaloids are carcinogenic.

4. Nicotine toxicity to humans has been associated with dermal exposure as well as ingestion or injection. Farm workers handling the insecticide have developed symptoms ranging from nausea, vomiting, pallor, and prostration, to tremors, convulsions, and respiratory failure, leading to death.[36]

B. Areas of Ambiguity

1. Core Tox Data for Nicotine is incomplete.[37]

IV. Analytical Procedures

A. Of the 66 identified species of *Nicotiana*, 52 are known to produce nicotine alkaloids. Although a PAM II method exists for the analysis of pure nicotine, individual alkaloids cannot be isolated due to their structural complexity.

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[34] Gosselin, p. III-311-313.

[35], [36] Ibid.

[37] EPA Reference Dose Tracking Report.

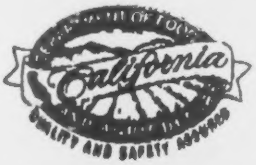
An analysis of copper compounds is not included in the current analysis and will be included at a later date. It should be noted that mined substances may contain high levels of contaminants. For example, sulfur dust was found to contain levels of the highly toxic substance, carbon disulfide, at 42 ppm. Carbon disulfide is listed as a reproductive toxin under the provisions of California's "Safe Drinking Water and Toxic Enforcement Act of 1986" (Proposition 65).

DRAFT

The California Department of Food and Agriculture
announces

The California Fresh Fruit and Vegetable Quality and Safety Assurance Program

Developed in cooperation with California's growers, packers and grocers
to assure consumers
that produce bearing this seal



has been grown and packed
under the highest degree of scrutiny
and the strictest pesticide laws in the nation.

Only California growers and packers who have certified
their voluntary compliance with these laws
are entitled to use this seal.

CDFA inspectors regularly monitor and sample produce
from participating packers and growers
to ensure that the requirements
of California's comprehensive regulatory program
are being met.

The program assures you and all consumers
that California produce bearing this seal
is of the safest and highest quality.

California Department of Food and Agriculture
Pest Management Division
1220 N Street
Sacramento, CA 95814

DRAFT

Quality Assurance and Safety Program

First year, pilot program to be conducted by Pest Management Division

Quality Assurance and Safety Seal can be utilized by participating growers and packers by contract with the Department.

Grower Requirements

1. Maintain accurate, field by field, pesticide application records on a form prescribed by the Director.
    a. A copy of the record must be submitted to the packer upon delivery of each commodity
    b. All records must be maintained by the grower and made available for inspection upon request of the Department.

Packer Requirements

1. Maintain accurate lot by lot, post harvest, packing house pesticide application records on a form prescribed by the Director.
2. Packers shall not co-mingle certified and non-certified commodities.
3. Quality Assurance and Safety Seal may be used only on produce from a grower under contract with the Department and packers must receive grower records prior to packing.
4. Records must be maintained by the packer and made available for inspection upon request of the Department.

Revocation of Quality Assurance and Safety Seal

Authorization to use Quality Assurance and Safety Seal [illegible] of willful and intentional or negligent violation of any law, [illegible] or label requirements pertaining to food safety.

Examples:

1. Illegal residues resulting from illegal dosage.
2. Violation of preharvest interval.
3. Use of a pesticide which is unregistered for the commodity or [illegible] tolerance is established.
4. Any violation of Section 12648 of the Food and Agricultural Code.
5. Violation of the CDFA Contract.

Reauthorization for Use of the Quality Assurance and Safety Seal

Approval to re-enter the Quality and Safety Seal Program may be authorized only by the Director. Approval will be considered based on the Director's acceptance of a plan for compliance and assurance of safe produce in writing

DRAFT

CDFA Responsibilities

1. Notify packers, wholesalers, and retailers of persons no longer authorized to use the Quality Assurance and Safety Seal.

2. Books and records inspections of participating growers, approximately 1,000 first year.

3. Collect and analyze samples from participating growers, approximately 2,500 first year.

4. Divert some marketplace surveillance samples to [illegible] as a secondary check on the use of the Quality Assurance and Safety Seal.

5. Revoke authorization and confiscate Quality Assurance and Safety Seal from growers who violate.

Personnel

Ten seasonal inspectors and one supervisor for approximately [illegible].

Funding

1. Fund established and administered by CDFA based on a [illegible] fee.

2. Funds in excess of administration costs may be considered for use to support IPM research in an effort to reduce pesticide usage.

NEWS
NEWS
NEWS
NEWS
from Department of Food and Agriculture California

1220 N St. Sacramento CA 95814

Veda Federighi, Information Officer
(916) 327-1409
Jan Wessell, Communications Director
(916) 445-6614

Release No. 89-64
RELEASE:
April 20, 1989

MORE WORKSHOPS ON PESTICIDE REGULATIONS SCHEDULED

The California Department of Food and Agriculture will be holding more workshops on proposed regulations that would require the reporting of all agricultural pesticide use. The public is invited to attend.

The series of workshops, which began earlier this month, will continue through June. CDFA staff members will explain proposed regulations that would require growers to report the use of all agricultural pesticides.

Under current law, licensed pest control applicators now report all pesticides used, but growers must only report the use of pesticides that are on a list of restricted materials.

Under regulations now being drafted by CDFA, the responsibility for reporting use of pesticides would shift to growers. The proposed regulations would require reporting of all agricultural pesticides used, with reports submitted annually or at the end of the growing season.

The regulations will be submitted to the State Office of Administrative Law in about two months. Formal public hearings on them will follow.

The workshops are scheduled as follows:

Red Bluff	7:30 p.m., Monday, April 24 Sun County Fairgrounds, Tehama Room
Fresno	2 p.m., Tuesday, April 25 Commissioner's Office 1730 S. Maple St.

MORE--MORE--MORE

VOLUME 39, NUMBER 15 NEW YORK, N.Y. MONDAY, APRIL 10, 1989

FTC Halts Red Food's Kroger Deal

CHATTANOOGA, Tenn. — Red Food Stores' purchase of seven supermarkets here owned by Kroger Co. was halted at virtually the 11th hour by the Federal Trade Commission, which decided the merger would substantially hamper competition in the market.

The FTC action came unexpectedly. It was characterized by its chairman, Daniel Oliver, as "a throwback to an earlier era, when the commission was more concerned with abstract measures of concentration than with competitive realities and consumer welfare.

See SALE, Page 42

American Wins

Reversal Permits Lucky-Alpha Union; Appeal Seen Likely

By ELLIOT ZWIEBACH

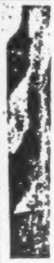
LOS ANGELES — American Stores got the decision it has been waiting for since September, a decision that may soon permit it to realize $1 million in weekly operational savings and unify its West Coast store banners.

The Ninth Circuit Court of Appeals here reversed a lower court decision and gave American the go-ahead to proceed with the integration of American's Lucky Stores and Alpha Beta units.

The ruling came on narrow legal grounds that seemingly failed to put to rest the question of whether the Lucky-Alpha Beta combination would lessen competition in California and

WHAT'S NE

FOR THE RETAILER: Sam Skaggs, American Stores' chairman, plans to proceed with integrating the Lucky-Alpha chains "forthwith."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California Set to Place Safety Seals on Produce

By CATHY COHN

SACRAMENTO — A state seal certifying the safety of produce could be a reality here in three weeks' time.

The result will be that retailers will begin receiving cartons with the State of California's quality seal affixed to produce items.

In fact, it is likely that California table grapes — the first summer fruit of the season — will carry the quality seal this summer. The seal is being designed and developed in response to mounting consumer concern over the safety and quality of produce.

Don Beaver, president, California Grocers Association, said growers, retailers and the state all agreed to launch the seal certifying that produce is safe. Grapes are expected to be the first commodity to carry the seal, but all California-grown

See ASSESSMENTS, Page 26

Kaufelt Bids

By RICHARD TURCSIK

ELIZABETH, N.J. — Stanley P. Kaufelt, chairman, president and CEO of Mayfair Super Markets here, last week made an offer to buy the 42-store chain for about $100 million.

The move by Kaufelt, who already controls and partially owns Mayfair, surprised analysts and left some wondering if the buyout offer was an opening gambit aimed at winning other bids.

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Assessments on Growers To Finance Seal Program

Continued From Page 1

product will be eligible for inclusion in the program.

The program will be paid for through assessments on growers, Beaver said. Preliminary plans call for a 1¢-per-container assessment that could raise $50 million for the program. It will be administered by the California Department of Food and Agriculture, according to Beaver. Specific details about collection procedures are still being ironed out, he said.

"The program's cost will be paid for through an assessment on growers, and this should produce sufficient funds to do additional testing, pay state administrative costs and help fund IPM [integrated pest management] research."

Stepped-up testing will require the certification of additional laboratories throughout the state, Beaver said.

Part of the funds raised will be used to expedite the certification of labs, and some will go to a public education program, he said.

Growers will be responsible for qualifying for the safety program through a series of documentations and usage requirements. Application records and other documentation will be required from growers wanting to use the state seal.

If a grower is found violating any of the safety program criteria, he won't be allowed to use the seal and could suffer financial setbacks as a result, Beaver said.

"The use of the seal can be pulled if [a grower] violates the agreement with the state. And you can bet that grocers will be hesitant to buy products without that seal."

Growers will be required to sign a contract with the state, agreeing to specific growing requirements and procedures, Beaver said. The details of the agreement haven't yet been decided, but it is likely that coun-

tion.

"The growers want this program," Beaver said. "They have all the liability."

Darcy Spangler, a spokeswoman for the Western Growers Association, said WGA members have been positive about the safety seal program.

"Although we believe food is safe and there is sufficient government testing to assure that safety, consumers continue to demand more assurances," Spangler said. "This program will add another layer of assurance."

"Although we believe food is safe and there is sufficient government testing to assure that safety, consumers continue to demand more assurances."

— Darcy Spangler
spokeswoman
Western Growers Association

She pointed out that use of the seal is voluntary for California growers, and those not interested in paying an assessment can choose not to.

However, if the safety seal becomes as important in the industry as CGA and WGA members hope it will, growers not using it may find it difficult to market product.

Dennis Icardi, president, Blue Anchor, a marketing cooperative of soft fruit, said he fully supports the safety seal program, and in fact, feels the program should be mandatory for growers. Rather than flooding the industry with individual certification programs by growers and shippers, Icardi said the state's program offers an overall safety seal for use by the entire industry.

packer/shippers, with lab testing, is the answer. That is a market-driven objective," Icardi said. The state's program will hopefully override the individual programs.

Blue Anchor has had its own certification plan ready for implementation for months, Icardi said, but waited for the state's program to be confirmed before adopting it. Now, he said, that plan won't be used.

Icardi said the industry needs a "neutral third party" to verify the safety and quality of product. In private testing, laboratories have ties to those paying the bill, but the state casts an independent eye on testing results, he said.

While growers are willing to foot the bill for the new program, Icardi said the entire industry should be called upon to help. "We are doing this to restore the confidence of retailers and consumers. Shouldn't tax dollars from the state be used — and, like CPQ [the Center for Produce Quality], shouldn't this be universally supported by every segment of the industry?"

Icardi added that the 1¢-per-container assessment will be difficult to pass along unless the program is mandatory. In a supply-and-demand industry like agriculture, growers have a hard time passing along production costs, he said.

Once the safety seal program is in place, it is important that retailers train store-level personnel on the program, Icardi said. "We can have all the corporate vice presidents of produce and vice presidents of marketing understand the program, but the real need is at store level — with the guy who sees the consumer eye-to-eye."

California table grapes will be the first commodity to use the seal, and will be a test of the concept. The season's first

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Potato, Banai Despite Aldic

By CONSTANCE MALKO

Retail sales of potatoes an bananas have not been hurt a result of questions raise about the safety of aldicarb, a insecticide sometimes used o the two crops.

The two items have not bee hit nearly as hard as appl products were after concern were aired over the use of th chemical daminozide, know by its brand name Alar.

And while retailers conced that banana sales are off, the attribute it to a sudden an steep price hike and not to re ports about aldicarb.

"The aldicarb story may be case of crying wolf once to often," said Ed Laster, directo of produce operations, As sociated Grocers, Seattle "People got tired of listening t it."

The attention that has bee paid to the aldicarb question i not appreciable in compariso to that which was given t other issues. The effect tha aldicarb might have is not life threatening, but just causes a sick feeling, Laster noted.

Concern Rise Of Chile to Co

By JIM OSTROFF

WASHINGTON (FNS) — Produce industry officials last week expressed concern over the Chilean government's failure, to date, to give evidence that it will make good on a pledge to compensate U.S. firms for losses they incurred during the U.S. sales embargo of Chilean produce.

Meanwhile, several retailers contacted by Supermarket News reported they have begun to be compensated by their suppliers for losses incurred in the massive embargo.

"We are concerned about the lack of details [about a Chilean government-backed compensa

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ASSOCIATED PRESS

Demonstrators outside *a presidential task force hearing in Los Angeles call for a ban on oil drilling off the coast of California and enactment of an ocean sanctuary law. Inside, Sen. Pete Wilson said California already was pulling its weight in terms of producing energy, as it is second to Alaska in total offshore oil production. "Tanker spills, air pollution, fishery habitat disruptions and other costs are too high a price to pay to achieve a mere 1 percent improvement in our energy security posture," Wilson said. Lt. Gov. Leo McCarthy testified, "The people who tell California that offshore drilling is environmentally safe and sound are the same people who told Alaska a tanker spill could never happen."*

Assembly rejects produce labeling

It fools consumer, member says

By Steven A. Capps
EXAMINER SACRAMENTO BUREAU

SACRAMENTO — An Assembly panel has rejected a plan to label produce sold in California with state-sanctioned seals of approval, with one member calling the idea "a phony public relations program."

The plan, developed by the state Department of Food and Agriculture and pushed by California grocers last month, arose after concern over the use of Alar on some apples and two Chilean grapes found laced with cyanide.

The idea was to label produce with seals saying "quality and safety assured," although that was later changed to "quality and safety program."

The department sought to implement the plan administratively but needed approval for more money in this year's budget. Sen. William Campbell, R-City of Industry, approved the extra $100,000 as chairman of the Joint Legislative Budget Committee.

The department, however, needed $1.3 million to implement the program during the new fiscal year, which begins July 1. A Senate budget subcommittee approved that request last week, but the Assembly panel rejected it Wednesday.

The plan will be discussed during final negotiations on the new budget, but the legislative counsel's office dealt a harsh blow to the idea Wednesday when it said the program could open up the state to more lawsuits.

The department said part of the program included a 20 percent increase in testing for pesticide residues. But consumer groups said that was not true and said even if it were, the testing still would be of less than one-tenth of 1 percent of produce sold in the state.

Consumer groups have opposed the plan because they say the state has no way of knowing whether the produce is safe or not. They found a champion in Assemblyman Gerald Felando, R-Torrance, at Wednesday's meeting of the Assembly Ways and Means budget subcommittee.

"I think that this is a phony program," Felando said. "It's a phony public relations program dreamed up by the department."

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PREPARED STATEMENT OF THE U.S. FOOD AND DRUG ADMINISTRATION, PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Mr. Chairman:

This statement is being submitted for the record of the hearing on S. 2108, the "Organic Foods Production Act of 1990." The bill would, among other things, establish national standards for production and labeling of "organic" agricultural products, an Organic Standards Board, and an accreditation program for laboratories that analyze foods to certify compliance under this program.

This statement will discuss the current responsibilities of the Food and Drug Administration (FDA) regarding monitoring of pesticide residues in or on foods and food labeling. The statement will also present our concerns about S. 2108.

BACKGROUND

Under the Federal Food, Drug and Cosmetic Act (FDCA), a food is adulterated if it "bears or contains a pesticide chemical," unless the quantity of the chemical is within the limits, or tolerances, established by the Environmental Protection Agency (EPA). (A tolerance is the maximum amount of a pesticide residue legally permitted in or on a specific food that results from using the pesticide according to EPA directions.) FDA is the agency responsible for enforcing tolerances for pesticide residues on all foods shipped in interstate commerce, except meat and poultry, which are under the jurisdiction of the U.S. Department of Agriculture (USDA).

FDA is also responsible for assuring that all foods shipped in interstate commerce (except meat and poultry) are labeled in accordance with the provisions of FDCA, which, among other things, prohibits labeling that is "false or misleading in any particular."

It has been FDA's experience that consumers interpret the term "organic" to mean that a product is "pesticide free" and that foods labeled "organic" are inherently safer than foods that are not so labeled. Following public hearings in the late 1970's, FDA, USDA, and the Federal Trade Commission (FTC) published an Advance Notice of Proposed Rulemaking, setting forth their positions on this and other food labeling issues. FDA, in agreement with USDA, stated that because it is false and misleading to claim that "organic" foods are superior in nutrient content or safety, such statements of superiority on food labels should be prohibited. FDA still holds this view.

S. 2108

One of the goals of S. 2108 is to enable consumers to distinguish between foods that have been produced using alternative farming methods by establishing a uniform standard for "organically produced" foods and providing incentives for farmers to use fewer and/or lesser amounts of synthetic pesticides and fertilizers. FDA recognizes that consumers may wish to purchase "organic" foods due to concerns about pesticide residues or the effects of agricultural chemicals on the environment, or that they may simply wish to know how the foods they purchase were produced. FDA also acknowledges that a definition for "organic production" of agricultural commodities might provide guidance to the States in establishing their own guidelines.

FDA is concerned, however, that by distinguishing "organically" produced foods from those that are produced using other methods, the bill may lead consumers to believe that the foods they now consume (those that are not "organically produced") are unsafe. For instance, the bill states that one of its purposes is "to assure consumers that products labeled as organically produced are not produced . . . or handled with, compounds that cause adverse human health or environmental effects." The bill thus implies that "organically produced" food is safe, and that food produced using pesticides, fertilizers, or other "synthetic chemicals" is not.

FDA disagrees with this premise. FDA's monitoring of the food supply for over 25 years has shown that fruits and vegetables grown using agricultural chemicals contain only low levels of pesticide residues, and that residues above legally established tolerances are rarely found. For example, in 1988, FDA analyzed a total of 18,114 samples of domestically produced food from all 50 States and Puerto Rico and imported food from 89 countries for pesticide residues. In more than 96 percent of the samples, no illegal residues were found. More than three-fourths of the violations were for pesticide/commodity combinations for which no tolerance has been established. This bill, however, might cause consumers to erroneously conclude that foods produced with the use of agricultural chemicals are not safe, when they comply with the stringent residue standards established by the EPA and are, indeed, safe.

FDA recognizes that supporters of "organic" labeling wish to convey the idea that food thus labeled was produced without the use of chemical fertilizers or pesticides. In fact, whether natural or synthetic, all fertilizers consist wholly of chemicals, be they derived from animal, vegetable, or mineral sources. Food produced using substances from any of these sources can be wholesome, fully nutritious, and safe.

The statement that a food has been "organically produced" implies and is often accompanied by assertions that such food is superior in safety or nutrient content to food not labeled in this fashion. FDA is not aware, however, of any scientific evidence, that "organic" food is any safer or any more nutritious than foods produced using conventional methods. Indeed, consumers should bear in mind that foods produced without using agricultural chemicals may be subject to hazards or have defects different from those encountered in foods produced using other farming methods. For example, corn grown "organically" may have more immature kernels, and thus, may be more susceptible to invasion of the Aspergillis mold that produces the carcinogen, aflatoxin.

This should not be construed to mean that FDA advocates the unnecessary or indiscriminate use of pesticides and other compounds in the production of food. Rather, we recognize that there are legitimate concerns about the continued reliance on chemicals in the production of food and possible effects on the environment. For this reason, a uniform guideline for "organic production methods" may be in order. We do not believe, however, that food labeling is an appropriate means of addressing such concerns. FDA believes that a voluntary national standard may provide a workable solution. For example, the Model Animal Feed Bill was developed with FDA's advice by the Association of American Feed Control Officials. States have used this Model Bill to draft their own legislation. FDA believes that if a national organization, such as the National Association of State Departments of Agriculture (NASDA), were to likewise sponsor a Model Organic Food Bill, the need for national uniform guidelines for organic producers would be met without the costs of establishing a complex Federal organic foods bureaucracy.

S. 2108 proposes the establishment of a complex Federal system to oversee and promote "organic farming," and would allocate large appropriations to establish and administer the program. FDA is concerned that the enormous costs of implementing this would be passed on to consumers, while doing little to enhance the safety of the U.S. food supply.

FDA suggests that the expenditure of funds necessary to implement this bill might not be justified by the small expected impact on food safety. We are also concerned that S. 2108 ignores the existing role and responsibilities of FDA in regulating the safety and labeling of foods, and food and feed additives as set forth under the FDCA. For example, while the bill specifies that the labeling and misbranding provisions of various laws shall also apply to products labeled under this bill, it is unclear whether these products would continue to be subject to the requirements of the FDCA, since that law is not mentioned.

The bill is also vague with respect to responsibility for enforcing violations of its provisions. Currently FDA is responsible for monitoring food labels for compliance and initiating enforcement actions against all food products (except meat and poultry) whose labeling is "false or misleading in any particular." Conceivably, foods may contain pesticide residues that are below EPA tolerances (and thus safe under the FDCA), but exceed the standard for "organic" set forth by the bill. If FDA is intending to enforce the provisions of this bill, we would seriously object to the diversion of our scarce food safety resources to enforce labeling requirements for food that is not unsafe.

S. 2108 would establish an Organic Standards Board that would develop a "National List" of "synthetic" or "natural" substances that may be used to produce or handle "organic" foods, "even though the use of such substances is prohibited" under title I of the bill. In addition to the inherent contradiction with respect to the bill's stated objectives, FDA is concerned that such a list may contain substances which Federal regulators have prohibited, and prohibit compounds that have been determined to be safe when used according to their labeling. Furthermore, the Board's members would be drawn primarily from the organic foods industry. We are concerned about a Board making regulatory decisions that directly affect the industry it represents.

In addition, the bill specifies that laboratories that find violative residues must report this information to USDA, rather than FDA, the agency charged with the responsibility of ensuring compliance with existing tolerances for pesticide residues. FDA believes that this again ignores current responsibilities as they are established within the Federal Government.

We would like to point out that nothing in current law prohibits a producer from making truthful label statements that he did not use pesticides to produce the commodity. For example, a grower may legally label a food, "grown without the use of synthetic pesticides." Even under the auspices of the program proposed by S. 2108, however, such food may not necessarily be pesticide free, nor, more importantly, would it be safer or more nutritious. Therefore, promotional statements to this effect could be false and misleading.

CONCLUSION

In summary, FDA believes the bill establishes a program for "organic" foods that erroneously implies that foods produced using agricultural chemicals or modern technology are unsafe. Furthermore, FDA is concerned that the bill ignores the existing authority of FDA and other Federal agencies charged with regulating pesticides and pesticide residues on foods, and labeling of food products. Finally, we are concerned that the cost of establishing the complex infrastructure to oversee and promote "organic" farming would be extraordinarily high, could divert attention and scarce resources from existing public health and safety problems and programs, and would be passed on to consumers in the form of higher prices without any proven public health benefit.

For the above reasons, FDA opposes passage of S. 2108.

PREPARED STATEMENT OF THE CALIFORNIA CERTIFIED ORGANIC FARMERS (CCOF), SANTA CRUZ, CA

Re: S. 2108

California Certified Organic Farmers is a nonprofit, agricultural association of organic farmers and supporting members dedicated to the independent verification of organic production systems in California. We are the largest nonprofit certification organization in the Nation. Among our members are some of the largest and most prominent agricultural producers in the Nation, including Lundberg Family Farms, Pandol Brothers and Stephen Pavich and Sons. However, it is not only large farms who are represented in our organization. The backbone of our organization is a grassroots movement of hundreds of family farmers. All of these growers, working 20 acres or 2,000, are participating in one of the most exciting developments in agriculture today—organic farming. Our program currently includes 605 growers working over 60,000 acres. Virtually every type of crop grown in California is successfully being grown organically by CCOF members. CCOF growers supply a majority of the Nation's supply of certified organic fruits and vegetables.

CCOF would like to thank Senator Daschle and the subcommittee for the opportunity to submit supplemental testimony for the record on Senate bill 2108. While we strongly endorse the testimony of the Organic Farmers Association Council, issues were raised during the oral testimony that we feel deserve additional comment.

CCOF has spent 17 years developing a state-of-the-art certification system. We publish a 40-page Certification Handbook each year, conduct a series of Organic Farm Inspector Trainings for hundreds of attendees from several States and Canada, and annually inspect and document every farm, acre and animal in our program. We are involved in several sustainable agriculture research projects, and participate in numerous educational forums in consumer, environmental, and academic arenas.

CCOF has been instrumental in developing State legislation to define the terms and practice of organic farming. Members of CCOF drafted, wrote and helped to pass the 1979 Organic Foods Act in California, providing the early model for many of the current organic laws in other States. We are currently sponsoring an overhaul of the California statute (California Assembly Bill 2012) to upgrade the production standards and design a grower-funded enforcement program.

We have numerous grower members on the University of California Sustainable Agriculture Advisory Board as well as the Boards of local Farm Bureaus. Our members have been actively involved with the creation of national legislation defining organic. In addition, we are participating in discussions with the Produce Marketing Association, United Fresh Fruit and Vegetable Association, the Organic Foods Alliance and many organic farming associations about a national organic definition. In short the establishment of clear, enforceable organic standards on a national basis is a primary goal of our organization, and an issue which we are uniquely qualified to address.

California Certified Organic Farmers supports the establishment of uniform national standards defining the use of the term "organically grown." We believe that the establishment of uniform standards will allow the national marketplace to develop in an orderly manner. However, such standards must be enforced if they are to be effective. While we do not yet see evidence of massive fraud in the marketplace, strong enforcement is necessary to prevent misunderstanding of what the term "organic" means, and the possibility of unscrupulous marketers taking advantage of the absence of State regulations. Effective enforcement will also serve the rapidly emerging overseas interest in organic commodities.

In an era of budget austerity, the most cost-effective approach is a public-private partnership. This approach should utilize the best of the systems developed by the industry to regulate itself, with appropriate oversight and accountability to public agencies. We believe that S. 2108 embraces this basic approach in its provisions for accreditation of public and private certification agencies. Without provisions for accreditation of the nonprofit certification programs that have built the integrity of organic foods, we would oppose the bill's demand for mandatory certification. We do feel that the certification requirement should be waived for producers selling less than $5,000 of organic product annually.

While the oral testimony to the subcommittee on March 22 identified certain areas of disagreement among various constituencies active in the organic foods industry, the record reflects the many key points of agreement: a required 3-year transition to organic; mandatory recordkeeping with an independent audit conducted by a certification agency; registration of certification agencies with government oversight; and perhaps most importantly, the fact that all organic certification organizations are in agreement on 90 percent of the allowed inputs.

However, during the oral testimony several concerns about the bill were raised with which we strongly disagree. Therefore we are grateful for this opportunity to comment on these issues.

Grower Participation in Regulatory Boards

We must strenuously object to the suggestion that growers be excluded from the regulatory and promotional boards proposed in S. 2108. This suggestion has been made by a single "consumer" group, and bears no relation to the historical development of the organic trade or our industry's record of public accountability. We support the concept of broad-based regulatory/promotional bodies which include all participants in the organic food chain. We strongly support a structure which provides a majority of producers on these boards. Grower representation is not only desirable but necessary. The merits of grower representation are these: grower advocacy of government oversight; grower possession of expertise in this area; historical institutional hostility to the organic farming community; and the extreme diversity of the grower community.

Organic growers were the *first* to call for governmental oversight of organic standards. Having been forced to develop our own tools within the marketplace for documentation and verification of claims, we understand more acutely than any other group the need for stringent standards and public accountability. In early 1988, a CCOF representative visited the Senate Agriculture Committee staff and presented the case for Federal legislation establishing a national standard, thus beginning the process which has resulted in S. 2108. We were calling for a government role long before other groups found it fashionable to be concerned about organic foods standards.

The methods of organic farming and certification have been developed by the grower community with virtually no assistance from agricultural research and extension institutions—the growers are the ones with the expertise in this area. Although the prospect of new funding programs has called many onto the bandwagon, the staff of these institutions will tell you that they are getting their best information from the growers. Likewise, all of the newly created State regulatory programs have taken their basic structure and methodology from the established nonprofit certification groups (and perform similarly for a much higher cost).

The organic movement has developed into an industry despite active opposition from many of the State and Federal agencies whom we are now proposing to be our regulators. While we have great faith that a new, productive relationship has already begun with these agencies, we are not yet very far from the days when organic agriculture was scorned. The public's interest in developing a vibrant organic industry will not be served by surrendering the ability of growers to have a voice in the bodies which will determine our fate.

Fears of a monolithic block of producer interests undermining the concerns of the consuming public are simply unfounded, given the real situation in our industry. In contrast to traditional single-commodity boards, the organic producer community encompasses scores of crops, every different type of livestock, the maximum range of farm sizes, and every region of the country. There are many different needs among all these constituencies that must be considered by the national organic boards. Achieving fair representation within this diversity is the real problem, and this mitigates the potential for some hypothetical subversion of public interests.

The grower community is united in its fundamental concern for maintaining the trust between producer and consumer. Refining our standards and practices to enhance the safety of our products and the quality of the environment has always been our priority and will continue to be. We welcome consumers, wholesalers, retailers and environmental activists with established expertise in organic farming methods to a board with oversight authority. The record will show that we have been asking for just this type of commitment from other interested parties for years.

ALLOWED MATERIALS—GUIDELINES AND PROCESS FOR REVIEW

Our position on allowable materials for production inputs is as follows: the primary presumption against use of synthetically compounded materials is the historical basis of our industry and should be maintained. However, 100 percent adherence to this exclusion is neither rational nor useful to the public interest. (Similarly, the prohibition of *any* medication for ill livestock serves neither the consumer nor the goal of animal health.) There are clearly a small handful of synthetic materials which serve every goal of organic farming better than the natural materials available for the same purpose. The grower community has been working diligently with its members and other groups to codify the guidelines which are needed to make these distinctions. The Organic Farmers' Associations Council has produced a detailed proposal for these criteria which we strongly endorse. These criteria include the environmental impacts and the health effects of any material which might be considered as an exception.

We believe that these criteria should also be applied to any naturally derived materials about which there may be concerns. The health and environmental effects of some natural botanical pest controls, for example, should be reviewed at the earliest possible date by a national standards board. Growers share the concerns about these types of materials, but need the resources of a broadly representative, national body to conduct a thorough and thoughtful review.

The organic industry currently agrees on about 90 percent of the materials allowed as inputs for organic growers by the various State groups. This list should be the starting point for any review process, either as part of the statute, or as accepted for initial approval by any board created to oversee the industry. Materials which are to be prohibited after a review process should be phased out with some concern for the availability of alternatives.

PESTICIDE RESIDUE ANALYSIS

Residue testing is a controversial issue among all growers in the United States. It is a practice which lacks standardized protocols and is fraught with inconsistent results. CCOF and other nonprofit certification groups have instituted a residue testing program which serves as a complementary tool within our overall verification programs. It is designed to identify the possibilities of synthetic chemical background contamination. Early indications are that most growers do not have significant background contamination problems.

Due to the universal possibility of trace contamination, the establishment of any limits for background residue contamination without specific testing protocol is unacceptable. Growers would be financially ruined if they had to test for every chemical ever introduced into the environment. It must also be recognized that there are many chemicals which can't be tested for at all. Therefore CCOF would support the proposed limit of 5 percent of Federal tolerance *if* the routine testing required is specifically limited to a multiresidue screen for Organochlorines and Organophosphates. We would further support a gradual reduction of this limit, based on the data for specific chemical groups, if the reduction is phased-in over a 10-year period. Absolute zero for all chemical groups is impossible to attain.

LISA LABEL PILOT PROJECT

CCOF does not support the creation of a sustainable agriculture labeling pilot program. Much more work must be done on defining this body of practices before such a program would have value in the marketplace. However, we do support the creation of a "transitional organic" label. We propose that this language be moved to title I; such a term would identify production which meets all of the standards outlined in title I with the exception of the 3-year transition time. Growers would be able to use this label after 1 year of verified organic practices.

ORGANIC PROMOTIONAL BOARD

CCOF supports the concept of an Organic Promotional Board, but doubts that the industry can yet generate the funding for an effective program. Given the scarce resources of the industry, priority must be given to materials information development and enforcement of the standards contained in S. 2108.

LABORATORY ACCREDITATION

CCOF supports the creation of a lab accreditation program. Given the wide disparity of information given to growers from soil and residue testing laboratories, some form of government oversight is needed.

In closing, CCOF stands in favor of a strong, clear national standard for organically grown commodities. We have asked for government oversight for State and nonprofit agencies conducting certification programs. We support the development of a national list of acceptable materials but we will not be denied representation on any decisionmaking body. Shutting out organic farmers with decades of experience would indicate to us another attempt to stop the growth of this movement and would destroy grower support for the bill. We stand for more university research on organic farming priorities and we welome the participation of all conventional agriculture producers.

Organic Agriculture has come of age. We have responded to environmental, consumer and marketplace demands to develop a specialized production system. We do this under the banner of the consumer's absolute right to know how their food was grown. Growers are making a profit, consumers are demanding more organic food and the only barrier to the expansion of this exciting development in American agriculture is the lack of national standards and enforcement provisions. With some adjustments S. 2108 fits our collective needs. We thank the subcommittee, as well as Senator Leahy and his staff for their diligent work, and we urge rapid consideration of this important legislation.

Submitted March 30, 1990.

PREPARED STATEMENT OF THE AMERICAN SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS (ASPCA), WASHINGTON, DC

The American Society for the Prevention of Cruelty to Animals (ASPCA), on behalf of its approximately 400,000 contributors nationwide, thanks you for the opportunity to testify regarding S. 2108, the Organic Foods Production Act of 1990. Founded in 1866, the ASPCA, America's first humane society, is a private not-for-profit corporation currently operating animal shelters, veterinary hospitals, humane law enforcement, education and legislative programs, and an Animalport at John F. Kennedy International Airport. We are dedicated to securing protection for all animals and preventing unnecessary pain and suffering regardless of whether they are found in the wild, in laboratories, zoos, live as pets, or are raised for food.

It is because of this commitment to the care and protection of animals raised for food that we are testifying on S. 2108, a bill that would set national standards for the development of foods. Passage of this bill will give farmers and ranchers a niche in the marketplace, a segment defined by government standards in which to sell a product that is developed using no substances known to be harmful to human health or to cause pollution of the environment such as synthetic pesticides and subtherapeutic doses of antibiotics.

The ASPCA supports the passage of an Organic Foods Production bill because we have felt for some time that the development of alternatives to intensive animal husbandry systems are badly needed. The majority of animals raised for food are raised in such confined conditions that producers must rely on the subtherapeutic use of antibiotics and other drugs to keep them alive until slaughter. For example, calves raised for the white veal industry are kept in crates so small they are unable to turn around or lie down with their legs outstretched. They are fed an iron-deficient diet consisting of a milk replacer laced with antibiotics. The pale flesh of the meat is a result of this diet and the fact that these animals are denied necessary physical exercise. Hens that produce our egg supply are confined in small cages, cannot spread their wings normally and frequently stand on top of each other. While many of us think that this is reason enough to encourage the development of alternative systems, others have become aware of what we have known for some time—intensive animal husbandry impacts adversely on the health of the consumer as well as the animal.

The ASPCA recently commissioned a research paper on the relationship between intensive animal husbandry systems and food safety. The report details serious food safety and other hazards created by intensive operations. One of the report's conclusions is as follows:

> To hold down diseases and to enhance productivity without abandoning the advantages of the intensive confinement system, producers resort to commercial drug, hormones and chemical applications, as these often are the most cost effective and bring about the most rapid and dramatic results. Many of these compounds are either highly bioactive or toxic in humans and residues of them can remain in animal food products. Moreover, they tend to suppress animal diseases and symptoms without eliminating the intensive operations pathogen pool. Many of the pathogens are zoonotic, that is, they can communicate diseases to humans. Thus two human health hazards—toxic residues and foodborne disease—are woven into the food chain at the earliest possible point.

The ASPCA believes changes in current animal agricultural practices to promote the development of a safer food supply are long overdue. Specifically, we support the provisions in S. 2108 which set out requirements that must be met for a producer to participate in the organic growing program. In order to qualify for a government-certified label farmers may not use subtherapeutic doses of antibiotics, internal parasiticides on a routine basis, medications other than vaccinations in the absence of illness, and must use feed that is produced organically. In addition, the animals drinking water must be pure and without pesticides and nitrates. The bill mandates periodic residue testing and unannounced site inspections which we feel are important in order to gain the confidence of the public in the organic label. This public confidence is a necessary ingredient in the long-term health of this program and the future of organic farming. A large segment of the American public wants to purchase organic food, but is concerned about the lack of any uniform standards for what "organic" means.

In addition, while crop farmers have had difficulty producing, organically, in this unregulated environment because of this lack of uniformity, those involved in animal agriculture have met even greater obstacles to marketing meat labeled to be antibiotic and drug free. Unlike produce, meat already goes through a government agency, the USDA, on the way to the marketplace. Producers raising organic meat products have met great resistance by the USDA to a label explaining the organic husbandry systems used. Thus, the USDA seems to have been an obstacle to the development of organic meat and dairy products to date. The passage of this bill will clear the way for producers by setting standards for the producer and the consumer and by applying a stamp of endorsement with a government approved organic label.

We thank you for allowing us to share our position on S. 2108 with the subcommittee.

PREPARED STATEMENT OF DANIEL D. HALEY, ADMINISTRATOR, AGRICULTURAL MARKETING SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman and members of the committee:

We appreciate this opportunity to submit written testimony to your committee outlining the Department's views on S. 2108, the proposed "Organic Foods Production Act of 1990." S. 2108 would establish (1) national standards for the production, certification and labeling of organically produced agricultural products; (2) a national promotion, research, and consumer information program to promote the sale of organically produced agricultural products; (3) at least a four-State demonstration program for labeling foods produced through low-input sustainable agriculture; and (4) a national laboratory accreditation program within the Department.

The Department has no objection to national minimum uniform standards, to be adopted voluntarily by the States, for the production of organically produced agricultural products. We believe "organic production standards" could help eliminate confusion arising from the large number of differing State standards, and complement our continuing efforts to encourage low-input sustainable agriculture, integrated pest management, and other alternative production methods, thereby enhancing the agricultural community's ability to continue to protect the environment, conserve resources, and provide' consumers with a choice in their food supply. Such national standards should, however, be voluntary, premised on sound scientific data, and provided as recommended model guidelines or by regulation, rather than legislation, to facilitate continuing technological changes in alternative farming practices.

S. 2108 presents some very serious concerns to the Department, concerns which must be addressed from a regulatory and cost effectiveness standpoint at both the national and State levels. Because of these concerns, the Department opposes enactment of S. 2108.

TITLE I—NATIONAL STANDARDS GOVERNING THE ORGANIC PRODUCTION OF AGRICULTURAL PRODUCTS

Title I requires the Secretary to establish a national organic production program for producers and handlers of agricultural products and provides for the labeling of products as "organically produced" if the products have been produced and handled in accordance with the requirements of title I. The labels would be required to bear the seal of the Department. The Secretary or certifying agent would have exclusive authority to affix such labels. States would be authorized to implement organic certification programs for producers and handlers of agricultural products that have been produced using organic methods provided for in title I, with certifying agents certifying qualified farms or handling operations.

The bill establishes minimum standards for agricultural products to be labeled "organically produced" and prescribes the contents of an organic farm plan. It requires each organic farmer and handler to certify annually to the Secretary, the governing State official (if applicable), and the certifying agent that all products bearing the organic label have been produced and handled in accordance with the requirements of title I and any applicable State program. Annual on-site inspections are required for each farm and handling operation, as well as periodic residue testing to determine the presence of pesticides and nonorganic residues or natural toxicants. State certifying agents would be accredited by the Secretary, with such accreditation not to exceed 4 years. Approved State plans would be required to be reviewed by the Secretary at least once each 5-year period. Title I also requires the Secretary to establish a National List which itemizes specific synthetic and natural substances permitted and prohibited in the production and handling operations, based on a proposed National List developed by the Organic Standards Board established under title II of the bill. Further, title I provides for civil and criminal sanctions for violations of the title, and provides that transactions involving agricultural products labeled under title I shall be subject to the Perishable Agricultural Commodities Act (PACA), and that meat and poultry products labeled under title I shall be subject to the misbranding provisions of the Federal Meat Inspection Act (FMIA) and the Poultry Products Inspection Act (PPIA).

Title I as currently constituted would result in excessive government surveillance at both the national and State levels and require significant expenditures for staff resources which would be borne by appropriated funds. Mr. Chairman, we believe these excesses are hardly justifiable for an industry that today represents less than 2 percent of the total retail food sales in this country.

A more viable alternative, we believe, would be the development of national uniform organic production and handling standards, assembled by a national advisory board—similar in composition to the National Organic Board recommended in title II. Recommended national uniform standards could serve as a model to State legislatures and those organic producers who voluntarily wish to institute such standards for organic farming practices.

While the basic thrust and purpose of S. 2108 is to establish national uniform standards for organic production and handling, that basic intent is undermined under this bill in that States would be authorized to enact standards more restrictive than Federal standards. This compromises a very basic purpose of S. 2108 which is to facilitate interstate commerce.

Moreover, section 103 exempts from the requirements for the "organically produced" label those imported products with labels implying that a product is organically or naturally produced if the Secretary determines that such products meet production and handling requirements at least equal to those contained in this Act. This provision could potentially result in artificial barriers and require significant expenditures for certifying production and handling practices of foreign countries. It is also silent regarding the role of the Food and Drug Administration (FDA) with respect to products labeled "organic" under this bill. FDA is responsible for enforcing not only the labeling of imported food products (except meat and poultry) but also a major portion of the domestic food supply as well. FDA currently permits truthful label statements regarding the use of pesticides in the production of food.

Of equal concern is the provision which gives exclusive authority to the Secretary or certifying agent to affix a label which would indicate the product has been "organically produced" and which would bear the seal of the Department. This provision ignores FDA's role in food labeling, and could require the presence of either Federal or State personnel at virtually every stage in the production and handling process, thus requiring huge expenditures. We believe this requirement is excessive, unwarranted, and contradicts traditional labeling practices in the production, handling, and processing of conventionally produced agricultural products.

Other areas of grave concern to the Department are the requirements of ongoing domestic and emergency pest and disease control programs carried out by the Animal and Plant Health Inspection Service (APHIS). For example, if a certified operation is located in the middle of a pest or disease treatment area and the treatment involves nonorganic methods, the Department should be able to treat the property to eradicate or control the pest or disease outbreak. If not, then the organic operation would be a continuing source of reinfestation for surrounding properties and may actually result in more pesticide usage on the surrounding properties. Moreover, organic products that cannot meet postharvest requirements such as fumigation or cleaning or disinfecting would not be permitted to leave a quarantined area. This raises yet another very critical concern of the potential legal liability of the Department if it must treat an organic operation. The extent of the Department's liability in this regard should be clarified.

Another major concern is that under S. 2108 biological control agents are included in the definition of pesticide, under the Federal Insecticide, Fungicide, and Rodenticide Act. Unless biological control agents are specifically exempted, this could conflict with APHIS' ongoing programs using biological control agents and its long-term strategy to develop biological agents as alternatives to synthetic pesticides. S. 2108 could thus impact the use of insect traps for surveillance and detection if they contain pesticides or attractants prohibited under the legislation.

Although many nonchemical methods currently exist for control of some pests and diseases (including biological control and cultivation techniques), many pest and disease problems cannot be controlled without the use of chemicals. Although APHIS attempts, wherever possible, to use nonchemical means or integrated pest management methods, some programs will continue to require chemical methods.

In the area of residue testing, the bill requires residue testing and detection at 5 percent of the tolerance levels established by the FDA and the Environmental Protection Agency (EPA) and enforced by FDA. There are very few methodologies currently available that allow detection at that low level, nor are methodologies available for every compound that could possibly be used in food. The potential costs involved in establishing or improving such methodologies to accommodate 5 percent tolerance standards would be prohibitive. Along these same lines, the bill specifically prohibits the use of hormones in order to be organically certified. There are currently no existing methodologies that enable us to distinguish between naturally occurring hormones and synthetic hormones. As the committee may recall, this was a major part of the problem in U.S. negotiations with the European Economic Community over a hormone ban.

We believe it is extremely important to keep in perspective that the greatest food safety threat to consumers comes from microbial contamination (such as salmonella, campylobacter, or listeria), not from the pesticides, animal drugs or other chemicals that are cited in S. 2108. Under our meat and poultry inspection programs, the Food Safety and Inspection Service (FSIS) already conducts residue testing on a daily basis for pesticides, animal drugs and other chemicals and environmental hazards. FDA maintains an extensive program for monitoring pesticide residues in foods and drug residues in animal feed. There are also a few programs for microbiological residue testing, and efforts are continuing in that direction as a means of further assuring food safety. And, to supplement and complement existing pesticide data, the Department's Agricultural Marketing Service, along with the Economic Research Service, the National Agricultural Statistics Service and the Human Nutrition Information Service, have requested in the Department's FY 1991 Budget $25 million for a pesticide residue monitoring program that will focus on fresh fruits and vegetables at different stages in the marketing chain.

This leads to the overriding concern with S. 2108 that consumers may be led to believe that the food produced as a result of this legislation is significantly safer, more nutritious, or of higher quality. The question is: Do existing data either prove or disprove this? Consumers who are willing to pay more for perceived differences should have that choice, as long as they are not misled. But consumers who cannot afford higher priced foods should not be led to believe they are consuming unsafe, less nutritious, lower quality foods when this is not substantiated by valid research.

With respect to the enforcement mechanisms envisioned under the Perishable Agricultural Commodities Act (PACA), the Federal Meat Inspection Act (FMIA), and the Poultry Products Inspection Act (PPIA), we believe the enforcement provisions of these statutes are inappropriate in that they provide different criteria for what constitutes false and misleading. Moreover, the PACA's coverage is currently limited to fresh and frozen fruits and vegetables. S. 2108 would indicate that the coverage of the PACA would be extended to all agricultural products labeled "organically produced" including fruits, vegetables, grains, and livestock marketed for human and livestock consumption. This would mean that persons who trade in commodities other than produce would have to obtain a PACA license annually, pay the annual renewal fee, and, in turn, would be subject to the regulatory scheme developed under the Act since 1930. Thus, for example, they would be subject to civil penalty and other sanction for operating without a license; they would be afforded the opportunity to file reparation complaints involving contract disputes and to have such complaints filed against them; they would have the opportunity to gain trust protection, under section 5 of the PACA, for their sales and would be required to maintain sufficient trust assets to cover their credit purchases; and they would be made subject to license sanctions for failure to comply with the payment terms required under the PACA. Also, it appears that, under S. 2108, trading of livestock or fowl, or products derived from them, which are labeled "organically produced" would not only be subject to the Packers and Stockyards Act ("P&SA"), but would also be made subject to the PACA. Thus, persons who trade in such commodities would have to be licensed under the PACA as well as being registered under the P&SA and would be subject to regulation under both statutes. This could confuse members of that industry as there are some conflicts in the requirements under the two programs. For example, the P&SA requires that payment for purchases be made in a significantly shorter timeframe than does the PACA. Further, we believe the enforcement mechanisms envisioned through the PACA, the FMIA, and the PPIA would appear to duplicate the enforcement provisions already contained in the bill.

TITLE II—NATIONAL BOARDS

Turning to the organic promotion, research, and consumer information provisions, the Department has traditionally supported industry self-help measures to improve their position in the marketplace. As the need arises, we will work with the committee and the organic industry in developing a viable, industry-financed program, similar to programs which are currently in existence for several other commodity groups.

S. 2108 provides for the establishment of a National Organic Promotion, Research, and Consumer Education Program. The Secretary would establish a 208-member Initial National Organic Delegate Body, not exceeding 208 members, to exist for no longer than 3 years after the appointment of the members of the Body by the Secretary. Provision is also made for a 15-member Initial National Organic Board and a 15-member Initial Organic Standards Board. The bill further provides for establishment of a National Organic Assembly after termination of the Initial National Organic Delegate Body, comprised of at least two representatives from each State to the extent practicable, who are producers and handlers, as well as provides for the establishment of a National Organic Board and an Organic Standards Board. Producers and first handlers would pay annual assessments of $50 or $100 based on the average sales from the preceding 3 years, plus, under certain circumstances, a supplemental assessment which may be levied annually not to exceed .25 percent of the value of the products sold. Provision is made for refunds.

Of special concern to the Department in our preliminary review of the organic promotion title is the:

—size of the administrative apparatus which consists of three different bodies (208-member Initial Delegate Body, 15-member Initial Organic Board, 15-member Initial Organic Standards Board, as well as comparable size bodies after the first program is approved in referendum) often with duplicative functions;

—the use of appropriated funds during the first 3 years of operation;

—severe time constraints for nomination and appointment of the Initial Delegate Body, the Initial Organic Board, and the Initial Standards Board; and

—the level of assessments would not appear on the surface to generate sufficient revenues to operate a viable program.

The Department of Justice also believes that certain provisions concerning the boards violate the Appointments Clause of the Constitution. We understand that the Department of Justice will express its views on this issue directly to the committee.

In addition to these major policy concerns which must be addressed, the Department also has several technical changes to recommend to facilitate the administration of such a program.

Consistent with our policy on other commodity research and promotion programs, the Department remains strongly opposed to the use of appropriated funds for promotion-type efforts of industry groups. We also consider it highly inappropriate and a conflict-of-interest for Government officials to serve on these types of boards, as is envisioned under title II. Our role is to provide oversight and surveillance to effectuate the purposes of the law.

TITLE III—LOW INPUT LABELING DEMONSTRATION PROGRAM

This title authorizes a grant program for at least four States that have implemented a State organic certification program under title I. The Secretary would be required to establish two experimental labels for agricultural products produced on low-input sustainable farms, or on farms in transition to organic farming methods. The labels would bear the seal of the Department.

Our comments under title I relative to labeling would apply equally to title III.

TITLE IV—NATIONAL LABORATORY ACCREDITATION

Title IV authorizes the Secretary to establish a National Laboratory Accreditation Program, in consultation with FDA, to establish minimum standards concerning the quality of equipment, staff, and testing protocols used by accredited laboratories to conduct chemical residue testing of organic products. The Secretary may issue certificates of interim accreditation to laboratories that the Secretary determines are likely to successfully meet all requirements for full accreditation. Accredited laboratories would be required to review their accreditation every 3 years and pay a nonrefundable accreditation fee. The Secretary would be authorized to adjust fees annually, as necessary, to support the full costs of the laboratory accreditation program under this title.

We basically have no objection to the concept of a national laboratory accreditation program. However, we believe the title, as written, is too restrictive as it concerns the responsibilities of the Secretary. Rather than itemizing the specific requirements of the program in law, we believe it would be more desirable to implement the specifics of its design and management by regulation. There are various laboratory accreditation programs currently in existence within the Department as well as other government agencies. The Secretary could draw the best aspects from these to accomplish the purpose of the program, and have more flexibility to make changes to the program, as warranted.

Any Federal undertaking with respect to accrediting laboratories would have to be a collaborative effort involving USDA, FDA, and EPA.

The requirements that laboratories must meet for accreditation are too specific and somewhat stringent. For example, to require that laboratories complete *all* tests of samples is unrealistic in actual practice. We recommend that performance standards be established to allow the laboratories a reasonable and fair opportunity to attain accreditation. The provision for interim accreditation is acceptable if it is properly controlled. However, to place a time constraint of a maximum of 180 days for an interim accreditation could be extremely difficult to comply with in some instances given the potential 2,000 to 3,000 laboratories that could apply for accreditation under this title. We also believe that to limit the duration of laboratory accreditation to 3 years is overly restrictive. Periodic unannounced visits with no expiration date for accreditation would be equally as effective.

This title also requires the Secretary to provide performance evaluation samples for analysis to accredited laboratories not less than two times a year. Due to the variability of production practices, not all laboratories would be operating the entire year. Twice yearly samples would be inappropriate in many instances.

Again, not to allow a laboratory that has been denied or has lost accreditation to reapply for accreditation until at least 1 year has expired is extremely severe. The Secretary should be provided flexibility in dealing with such laboratories since situations could vary among the laboratories.

Our last comment concerns the payment of fees for accreditation. The title exempts government-owned laboratories which are performing work only in a reference capacity as a reference laboratory from payment of any required accreditation fee. The Department's position is that the Secretary must be reimbursed for the expenditure of funds used in the accreditation program and that all laboratories requesting this service should pay a user fee which will recover the full costs of the program.

CONCLUSION

In summary, the Department has no objection to voluntary national standards for organic production. However, we believe that S. 2108 would result in an unwieldy, costly and excessively burdensome program for Federal and State governments, as well as the organic agricultural sector. For the reasons outlined herein, we oppose enactment of S. 2108.

PREPARED STATEMENT OF THE HUMANE SOCIETY OF THE UNITED STATES (HSUS), WASHINGTON, DC

The Humane Society of the United States, which has more than 1 million members and constituents, appreciates the opportunity to submit testimony on S. 2108 (Leahy, D-VT), the proposed Organic Foods Production Act of 1990. The HSUS has become increasingly concerned about the environmental impact of many intensive practices used in animal agriculture. We believe that the multidisciplinary analysis of animal production systems is the only way to achieve the appropriate balance of costs and benefits—to farm animals, the environment and society itself. For this reason, the HSUS initiated a Humane Sustainable Agriculture (HSA) program in 1988 which addresses the issue of achieving this appropriate balance. Animal agriculture plays a predominant role in the agriculture industry, bringing in 53 percent of the total gross agricultural receipts for 1988 ($80 billion). It is, therefore, critically important to give careful attention to animal agriculture legislation affecting public health and the environment.

We salute the introduction of S. 2108 as a major step in promoting the goals of sustainable agriculture across the United States and support the overall direction of the bill. We have comments and suggestion on sections 102 (National Organic Production Program) and 114 (Animal Production Practices and Materials).

SECTION 102. NATIONAL ORGANIC PRODUCTION PROGRAM

In April 1989 the HSUS surveyed all 50 States to determine the extent of their activities in the organic sustainable agriculture area. The review revealed that, in most instances, sustainable agriculture programs are giving little attention to animal agriculture. Our review suggests that State governments are generally not prepared to assume the role assigned to them by S. 2108. Therefore, we question whether it is feasible to place sole responsibility for administering certification in the hands of State governments. This may have an adverse impact on the organic industry and undermine the intent of this legislative initiative. It is of major importance to utilize the wisdom that has evolved in this industry over the decades and to integrate their expertise into S. 2108.

The HSUS supports a baseline Federal law that would utilize the experience of the past several decades, sets the penalties for failure to comply, and regulate the use of the term "organic" within the industry. Livestock, for which standards are currently being developed, should be covered by section 102. However, we recommend that private certification be maintained.

SECTION 114. ANIMAL PRODUCTION PRACTICES AND MATERIALS

The HSUS has spent the past 2 years reviewing the guidelines of Organic Foods Production Association of North American (OFPANA) and the major certification programs in the organic industry. This review process identified significant common ground between our organizations, and we created a working group to establish guidelines for livestock and poultry. We have completed our first meeting on beef cattle and are planning a dairy meeting in June 1990. The working group has been joined by the recently established Organic Farmers Association Council (OFAC). OFAC has established a livestock committee to review the recommendations of the working group. The review process is an attempt to review animal agriculture species by species and determine the appropriate guidelines for each species. Regional, disease and other considerations are extremely important when assessing the standards for rearing "organic" livestock. While the HSUS is supportive of this bill, we recognize the need for establishing a national livestock and poultry board with wide representation to review each species, taking regional and disease considerations into account.

SECTION 114(e) DRINKING WATER

Since animal agriculture plays a predominant role in the agriculture industry, any agriculture legislation affecting public health and the environment must address animal as well as crop agriculture. With reference to drinking water, the National Academy of Sciences has identified agriculture as the largest nonpoint source of water pollution in our Nation. While the HSUS supports the corrective measures in section 114, we believe there is need for a much more complete assessment of the impact of livestock and poultry production systems on our water supplies, and the development of short- and long-term solutions. This goal is addressed for crops through the LISA (Low-Input Sustainable Agriculture) program under the Food Security Act of 1985. The HSUS recommends that animal agriculture be included in the LISA concept and that a study be undertaken to identify the current impact of *all* livestock and poultry systems on our water supplies. Only then, can we determine short- and long-term solutions to our water supply and other agriculture environmental problems.

In view of current widespread contamination of ground water from agrichemicals, the water restrictions contained in section 114 may be too restrictive and counterproductive. Rather than prohibiting farmers participating in the LISA program from watering their livestock from sources on their land in which trace residues of agrichemicals are found, we suggest that a transition period be established. Otherwise, this provision could become a roadblock to farmers who would otherwise begin to make the transition to organic farming.

At the same time, we urge that provisions be made for an economic assessment of the cost to taxpayers and industry to clean up all sources of pollution from animal agriculture practices—either in S. 2108, or pending proposed ground water legislation. Over time, this assessment will serve as a base to measure change and encourage industry to reduce such pollutants in agricultural products.

In summary, we support the concept of S. 2108 and are hopeful that our suggestions for improvement will be favorably considered as you move to mark up the bill.

PREPARATION FOR THE 1990 FARM BILL

Research Title of the 1990 Farm Bill

THURSDAY, MARCH 29, 1990

U.S. SENATE, SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION OF THE COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:45 a.m., in room SR-332, Russell Senate Office Building, Hon. Thomas A. Daschle (chairman of the subcommittee) presiding.

Present or submitting a statement: Senators Daschle and Conrad.

STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA

Senator DASCHLE. The hearing will come to order. I apologize for keeping many of you waiting.

Today's hearing represents the culmination of a series of hearings that this subcommittee has held on research over the last year. All of these hearings have had a primary goal of guiding the members of the subcommittee on what is needed in the research, teaching, and extension title of the 1990 farm bill. As we hold today's hearing to get summary input on this subject, I am ready to introduce legislation that will form the basis for the committee's markup of the research title. This legislation has three main goals:

First, to improve priority setting and technological assessment of publicly funded agricultural research.

Second, to enhance the competitive research program while maintaining formula funding.

Third, to provide for research programs in areas that have received inadequate attention, creating an overall sense of order to the statutes related to research.

Today's testimony will help us assess the extent to which these legislative proposals are responsive to the concerns of the members of the agricultural research community, and perhaps more importantly its users. Many observers have long been critical at the speed at which the agricultural research system adapts to changing demands. The priority setting legislation that I have developed will breathe new life into the Joint Council on Food and Agricultural Policy and the Users Advisory Board. A new focus is placed on socioeconomic implications of our research programs through more extensive technology assessment, related to a set of overall goals for the research system.

The 1990 bill must also explicitly address certain key areas of research that have either been only recently emerging or have had inadequate attention placed upon them in the past. The legislation I will introduce will address several specific areas. Doing more demand-related research is something that I have long advocated. In commodity policy, the government has a responsibility to try to facilitate achieving a balance between supply and demand. Too often we have focused almost exclusively on supply enhancing research that have led the need for supply control commodity programs. We must do more research to enhance the demand for agricultural products including the development of new crops and new uses in products, and certainly no one has been a more significant leader in that effort than the Senator from North Dakota.

You cannot open a newspaper today without reading an article on the Nation's water quality problems, and yet the research community remains behind the curve in providing us with the basic information we need to know how to tackle these problems. To get the information, we need to require establishing clear priorities and better coordination of research efforts together with a renewed commitment of adequate funding. We do this in S. 2024. The same can be said for our threats to our Nation from the potential of global climate change. Senator Leahy, the chairman of this committee, has taken great leadership in his introduction of S. 1610, which has already passed the Senate. I hope this legislation can become law as part of the research title of the new farm bill.

As we strive to maintain the sustainability of our planet from the threats of global climate change and water quality degradation, we must focus more on ways our farming community can contribute more while maintaining its profitability. This means pay more than just lip service to the concepts such as LISA and integrated resource management. We must achieve a research program that will help us implement practices that turn these concepts into a reality. Taken together with renewed commitment to the basic funding mechanism of our public agriculture institutions and a new emphasis on competitive grants, these initiatives can place U.S. agriculture where it needs to be in the 21st century.

I look forward to hearing whether today's witnesses share that view with me. Before we begin, let me call on the real power on this subcommittee, my colleague from North Dakota.

Senator CONRAD. Well, actually I am not on this subcommittee anymore.

Senator DASCHLE. You are this morning.

Senator CONRAD. But I am sort of honorary. I just wanted to thank the chairman for holding this hearing, and I wanted to thank him for the focus that he has given this issue and the direction that he is taking us in because I think it is a very healthy change. I think he has brought great energy and commitment to the task. I am looking forward to the witnesses that we will have before the subcommittee this morning. I thank very much the chairman for allowing me to sit in and participate.

Senator DASCHLE. Thank you, Kent.

Our first panel is comprised of Dr. Charles Hess, the Assistant Secretary for Science and Education at USDA, and Mr. Chuck Hassebrook from the Center for Rural Affairs, and who is one of the leaders of the Stewardship Technology and World Agricultural Program at the Center for Rural Affairs. If those two witnesses could come forth, we will take their testimony at this time.

Dr. **Hess**. Good morning.

Senator **Daschle**. Good morning, Dr. Hess.

Senator **Conrad**. Good morning.

Senator **Daschle**. Mr. Hassebrook, Dr. Hess, we are delighted to have you both, and let us proceed as we see you here. We will begin with your testimony.

STATEMENT OF CHARLES E. HESS, ASSISTANT SECRETARY FOR SCIENCE AND EDUCATION, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC

Dr. **Hess**. Thank you, Chairman Daschle, members of the subcommittee. I do appreciate the opportunity to appear here this morning to discuss the administration's science and education proposals for the 1990 farm bill. I would like to highlight items in the testimony and request that the prepared statement be incorporated in the record.

Senator **Daschle**. Without objection, the entire testimony will be made a part of the record.

Dr. **Hess**. Thank you.

CONSIDERATIONS

In preparation for the enactment of the 1990 farm bill, we have considered the impacts on agriculture of those social, economic, political, and technological changes which have occurred in the United States and throughout the world in the past 5 years. And, there really have been extraordinary changes both in technology, in economics, and the world situation, of course, has changed dramatically also. And, we have tried to anticipate the needs of agricultural sector during the next 5 years.

PROPOSING LEGISLATION IN SIX AREAS

Based upon this review, we are proposing legislation in six areas—amendments to the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and related acts—which we believe will serve the interests of American agriculture not only during the life of the farm bill, but into the next century. I would say it also goes beyond American agriculture, but I think it is in the interest of the people of our Nation.

The National Research Initiative is one of our proposals which have long-range benefits. The 1989 report of the National Academy of Sciences, "Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System," pointed out the urgent need to have a new investment in agricultural research.

Returns from investments in agriculture research are higher than any other research investment. We have many challenges facing agriculture in terms of environmental concerns, in terms of food safety, international competitiveness. We also have new tools in the form of biotechnology, computers, equipment, and I feel that even in a tight fiscal environment, it is essential that we do make an investment now to keep the United States on the cutting edge of technology in agriculture, and at the same time sensitive to environmental impacts of agricultural technology.

In the fiscal year 1991 budget request, we have requested $100 million to fund the first year of this national initiative. To the extent that the funds are awarded competitively and not earmarked for special purposes, the administration is also proposing that funding for this initiative be increased by $50 million annually throughout the outyears, bringing it up to a level of $300 million at least.

In order to carry out the National Research Initiative in Agriculture, Food and Environment, we are proposing language for incorporation in the 1990 farm bill to eliminate the funding cap on competitive grants program by amending section 2(b) of Public Law 89-106, which currently puts the cap at $70 million.

There has been a heightened recognition in recent years of the need to increase the number and diversity of young men and women entering science and mathematics and in agricultural sciences, in particular, from our perspective. We are already taking some important steps in this area in through our 1990 and 1991 budget and program proposals. We also believe that expanding the availability of competitive grants in agriculture will help attract young men and women into careers in the agricultural sciences.

Mr. Chairman, in the past 5 years there has been growing interest in sustainable agricultural practices, which you referred to in your opening comments. We define sustainable agriculture as a system that is economically viable and environmentally sound over the short and long term.

Conventional agriculture methods carried out over the last several decades have brought impressive gains in production through highly specialized, intensive farming practices. Food costs to the average American now are down to 11.8 percent of disposable income, which is the lowest that it ever has been, the lowest in the world. Yet many have come to believe that those gains have sometimes come at the cost of unforeseen adverse environmental effects.

The Low-Input Sustainable Agriculture (LISA) Program has provided a good foundation on which to build, and indeed, the administration has requested that it be funded in fiscal year 1991, which is the first time it has been, in fact, in the budget. For the 1990 farm bill, however, we are proposing changes to Subtitle C of the National Agricultural Research, Extension, and Teaching Policy Act Amendments of 1985 in the 1990 farm bill that will help develop and encourage sustainable practices, and that will promote full participation of the entire agricultural research community.

The legislation we are sending to Congress for its consideration will serve to promote the adoption of sustainable agricultural practices and demonstrate the commitment the Department is making to this effort.

THE ENVIRONMENTAL AND HEALTH ISSUE

The environmental and health issue is also addressed in four areas of our farm bill proposals: water quality; food safety; global climate change; and environmental and natural resources education involving the Cooperative Extension Service.

Our water quality proposal is designed to support President Bush's Water Quality Initiative which was announced in his fiscal year 1990 budget and which called for an intensive commitment by Federal agencies in curbing water pollution related to agricultural chemicals.

There are two science and education components relating to the initiative contained within our farm bill proposal, one relating to research and education, and the other to the U.S. Department of Agriculture's technical assistance program. As indicated in the environment and health section of title VII of USDA's background report on the farm bill, the "green book," we are not seeking new authorities for water quality in the research and education title. Current legislation provides ample authority for our research and education program. We are, however, proposing to underscore our commitment to improving water quality through specific language in the new farm bill.

ANOTHER AREA OF CONCERN TODAY IS THE NEED FOR INCREASED EMPHASIS ON FOOD SAFETY RESEARCH AND EDUCATION

Another area of concern today is the need for increased emphasis on food safety research and education. We are proposing specific farm bill language which will provide for the Department to have a more active role in research and education programs related to food safety by developing agricultural production and processing practices and systems that are economically viable while at the same time are protective of the Nation's food supply.

A PROVISION DEFINING THE DEPARTMENT'S CONTINUING ROLE IN RESEARCH AND EDUCATION RELATED TO GLOBAL CLIMATE CHANGE

Mr. Chairman, we are also asking that the new farm bill include a provision defining the Department's continuing role in research and education related to global climate change: evaluating the effects of agriculture and forestry production, processing, and transportation on the global environment, the effect of potential global changes on those agriculture and forestry industries, and ways in which agriculture can contribute to reduced greenhouse gases through photosynthesis and being a source of industrial hydrocarbons.

USDA IS CURRENTLY CARRYING OUT A NUMBER OF ENVIRONMENTAL AND NATURAL RESOURCES EDUCATIONAL ACTIVITIES

The Department of Agriculture is currently carrying out a number of environmental and natural resources educational activities in connection with a variety of programs. While the authority for these activities is implied in various legislative acts, there is no specific statutory language giving the Department the executing role. Thus, we are asking that the farm bill include language to clarify the Extension Service's important role in the education of the public on natural resources and environmental issues.

THE NEED FOR FINDING NEW INDUSTRIAL USES FOR AGRICULTURAL MATERIALS AND ENCOURAGING THEIR COMMERCIALIZATION

I will now turn to another area which has generated much interest in the agriculture community, the media, and the Congress, and on the part of the President—the need for finding new industrial uses for agricultural materials and encouraging their commercialization.

From its very beginning, the Department of Agriculture has been involved in research and development of new products. Yet, in recent years we have begun to realize the tremendous potential which exists in researching and developing nonfood, nonfeed uses of agricultural commodities. Oilseeds can be used to replace imported petroleum products, newsprint can be made from kenaf, and biodegradeable bags can be manufactured from starch. Thus, not only can we open new markets for American farm products, but also we can assist in cleaning up the environment and protecting natural resources through development of industrial materials from agricultural products.

We will target the use of public resources in cooperating with the private sector as it assesses the commercial potential of these new products. The Agricultural Research Service (ARS) and the Nation's land-grant colleges are frequently able to identify potential products, but additional developmental research may be required in order to bring them to the marketplace. We will make effective use of public talent in promoting successful technology transfer.

IN OUR CHANGING WORLD THE DEPARTMENT OF AGRICULTURE CAN MAKE AN IMPORTANT CONTRIBUTION THROUGH INTERNATIONAL COOPERATION AND RESEARCH, EXTENSION, AND EDUCATION

Mr. Chairman, at the beginning of my remarks, I mentioned our changing world. Certainly as we look at what is happening in Eastern Europe and Central America, we realize just how much it is changing. Nations which were once locked behind the Iron Curtain are emerging into the sunshine of freedom and democracy. Many of these countries need help in rebuilding their agricultural economies in order to provide adequate food supplies to their people, and to generate the income which is necessary to be viable in the world marketplace. As their economies strengthen they will become important trading partners for the United States. We believe the Department of Agriculture can make an important contribution through international cooperation and research, extension, and education.

TWO REASONS WHY U.S. PARTICIPATION IN THESE INTERNATIONAL ACTIVITIES IS IMPORTANT

U.S. participation in these international activities is important, I feel, for two reasons; the skills and talents of our agricultural scientists can help speed the process of development in many countries of the world—and I think it is critically important that we do stabilize those governments so that they can progress toward democracy—and the information and knowledge to be gained by these same scientists can be of inestimable value to American agriculture. Such participation also provides access to germplasm which is critical to U.S. agriculture since most of our commodities originated overseas.

Our farm bill proposal draws upon the Federal system and the land-grant system to meet research and educational needs and challenges posed in today's world. This proposal would emphasize the importance the Department attaches to international activities.

GERMPLASM CONSERVATION AND GENOME MAPPING

Our final proposal deals with an issue of great importance to the agricultural research community—and to the future of agriculture: germplasm conservation and genome mapping.

The USDA has been a leader in research to increase the production efficiency of plants and animals and to improve their nutritional quality. The need to collect and distribute the genetic resources necessary for this important work has long been recognized.

As a part of the National Research Initiative, the President's fiscal year 1991 budget proposes to initiate a major plant genome mapping program to decipher the genetic instructions that regulate traits that are important to agriculture such as drought tolerance, insect resistance, and disease resistance.

We are proposing to include specific language in the new farm bill establishing this program, and to assure that USDA's program is fully coordinated with other Federal and State agencies and the private sector in a national effort to preserve and document the valuable plant, animal, and microbial germplasm and genebanks within the United States.

Mr. Chairman, this concludes my prepared statement, and I will be pleased to answer questions.

[The prepared statement of Dr. Hess appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you. Mr. Hassebrook.

STATEMENT OF CHUCK HASSEBROOK, CENTER FOR RURAL AFFAIRS AND SUSTAINABLE AGRICULTURE COALITION, WALTHILL, NE

Mr. HASSEBROOK. Mr. Chairman and Senator Conrad, thank you for the opportunity to testify.

In addition to testifying today for the Center for Rural Affairs, I will be testifying for the Sustainable Agriculture Coalition, which is made up of 12 grassroots organizations which work directly with farmers practicing sustainable agriculture.

S. 2259

I would like to begin by commending you, Senator Daschle, for introducing S. 2259 (Agricultural Research and Extension Planning, Priority Setting, and Technology Assessment Act of 1990), your priorities bill, and express our support for that bill. I think that it really provides some very much needed guidance to the agricultural research system with respect to the broad purposes that publicly funded agricultural research is to serve and also with respect to some procedures that ensure that those purposes are reflected in the research priority-setting process.

AG RESEARCH IS A FORM OF SOCIAL PLANNING

As I have said in the past before this subcommittee, agricultural research is, in a sense, a form of social planning. By that I mean the decisions we make about how we spend agriculture research dollars, about which projects we fund, which types of farming systems we develop, which types of technologies we develop, go a long way in determining which farming systems and technologies are used in farms and subsequently, I think, profoundly shapes the rural environment and life in rural communities.

CONCERN

The concern I have is that currently the system is not adequately addressing those broad impacts and those broad purposes in setting its research priorities, and I think frankly we are not really giving individual researchers the tools that they need to begin to incorporate these types of consideration in deciding what research they do in developing their proposals. I think Congress did move in that direction, although somewhat tentatively in the 1985 farm bill when Congress expressed its sense that the research extension and teaching activities of the public system should be aimed at technologies that can be effectively used by small and moderate sized farms.

USDA IMPLEMENTATION A PROBLEM

Congress also in that bill directed USDA to develop extension programs that address the particular needs and particularly aim at meeting the needs of small and moderate sized farms. I guess my concern is that I do not think that USDA has really effectively implemented that language. I have seen no apparent emphasis on meeting the needs of small and moderate sized farms. In fact, in Nebraska, I could say the only extension program that I have seen aimed at any particular size of farm was a series that was done a couple of winters ago on addressing the problems of managing employees on large farms. I have seen very little aimed at the particular needs of small and moderate sized farms.

RESEARCH FOR SMALL AND MODERATE SIZED FARMS AND ITS APPLICABILITY

I think the same can be said with being careful to do research in technologies that can be effectively used by small and moderate sized farms. There simply is no systematic process within USDA for evaluating alternative research directions for what their impacts might be on small and moderate sized farms. The decision-making process does not include procedures for asking whether or not the technology that is the focus of the research is really effectively applicable to small and moderate sized farms, and I think that sort of thing is needed.

A case in point of current research where I think those types of questions should have been asked is the use of public funds to support research to develop herbicide tolerant crop varieties. It seems to me that if we are successful in developing those crop varieties, we can expect a number of impacts. It seems it is more likely to increase our reliance on herbicides for weed control and probably really offset the trend that we are seeing now to somewhat reduce reliance on herbicides. At least, the extension people in Nebraska tell me that people are moving away from broadcast application of herbicides. I would expect the development of herbicide tolerant crop varieties to reduce that.

ADVERSE ENVIRONMENTAL IMPACTS

I think in some cases it will have adverse environmental impacts. For example, when we are doing research to develop crops, for example, soybeans resistant to atrazine, an herbicide that is widely found in ground water and has been shown to have some adverse health impacts, that there are really some serious environmental and health questions with developing crops resistant to that herbicide. In other cases, we are developing crops resistant to herbicides that are probably safer, like glyphosate or Roundup®, but are very costly. And it seems to me that we could expect that type of research to increase the share of the farm dollar that moves off the farm out of the farmer's pocket into the input corporations.

A VERY DUBIOUS BENEFIT

It seems to me the only clear benefit I can see from this research, and I think it is a very dubious benefit, is that this type of technology will enable one person to farm more acres because they can eliminate mechanical cultivation. It seems to me the question, the central question that should have been asked before we put public money into that type of research, is whether or not that is the highest and best use of scarce public research funds because we cannot research everything, and we need to pick the best things.

For example, might we have been better off if instead of developing herbicide tolerant crop varieties we would have developed crop varieties more suitable to mechanical weed control? For example, if we had a corn crop that got up to a height of 6 inches in maybe two-thirds of the time of what current varieties take, a farmer could get very effective weed control mechanically for a lot less money than what he could do with Roundup® resistant corn. And it seems that would be a way that the farmer could use his or her management to replace inputs. The 500 acre farmer could more intensively apply his or her skills to replace inputs and that way keep more of the farm dollar on the farm and increase farm income, and it would really enhance the role of people in agriculture and be particularly beneficial to the moderate sized farm.

S. 2259

I think the problem, though, from a policy standpoint is that we are simply not systematically asking those questions, and that is why I think that S. 2259 is so important. The legislation establishes appropriately broad purposes for agricultural research that include: enhancing employment opportunities in rural communities, strengthening family farms, enhancing environmental quality, protecting human health, and at the same time continuing the longstanding purpose for agriculture research of enhancing efficiency and productivity. It defines procedures that are needed to ensure those purposes are reflected in the priority-setting process. I think it is particularly strong with respect to competitive grants. This legislation would very effectively direct awards to proposals for competitive grants to those types of proposals that really address these purposes.

S. 2108 COULD BE STRENGTHENED

The one area where I think it could be strengthened is to create some procedures for directing the use of formula funds, Federal formula funds, at land-grant institutions and also at the Agricultural Research Service toward research consistent with those goals. Maybe we should, for example, add to the existing peer review process a consideration of whether a researcher's work is advancing congressional purposes and then create a pool of awards funds to reward those researchers doing that type of work.

SOME SUGGESTIONS FOR REFINING THE MAKEUP OF THE USERS ADVISORY BOARD AND JOINT COUNCIL

I also would have some suggestions for refining the makeup of the Users Advisory Board and Joint Council. But nonetheless, we strongly support the legislation. We think it is one of the most important pieces of research legislation in years.

SUPPORT FOR SENATOR LEAHY'S LEGISLATION

Before I close, I also want to take this opportunity to express our support for Senator Leahy's legislation that would increase the LISA authorization and also redirect the money currently used on developing herbicide development crops toward research to develop lower chemical input weed control systems. I simply do not think that herbicide tolerant crop varieties are the highest and best use of public funds.

EXPRESS OUR SUPPORT FOR THE SUSTAINABLE AGRICULTURE RESEARCH EXTENSION MARKETING INITIATIVE

And finally, I would like to express our support for the Sustainable Agriculture Research Extension Marketing Initiative that has been developed by consumer, environmental and farm groups to redirect existing research funds toward sustainable agricultural approaches. I think that is worthy of your consideration as well. So thank you for the opportunity to testify.

[The prepared statement of Mr. Hassebrook appears at the conclusion of the hearing.]

Senator Daschle. Thank you, Mr. Hassebrook.

Senator Conrad, do you have some questions?

Senator Conrad. Yes, thank you, Mr. Chairman. I will be brief given the number of witnesses that you have this morning. I wanted to have the chance to ask Dr. Hess about two matters; one, low-input sustainable agriculture. What is the President's proposal in terms of a funding level?

Dr. Hess. It is a funding level of, I think, $4.5 million.

Senator Conrad. I would just say to you that that is just not adequate to meet the demand and the need out there. I had a hearing out in my State, a series of farm meetings around the State, and I really find substantial growth and interest and the number $50 million has been talked about a good deal. If we were able to find the resources to fund at that level, what would be your reaction to that?

Dr. HESS. Let me answer it in this way, Senator Conrad, that first of all, the $4.5 million is directed to that specific program which had some unique and important characteristics, the joint planning by the farmer and the researchers and the extension people, which is unique, I think, in the particular way it is structured. However, I would want to point out that a lot of other investment goes into developing the information that is used in that LISA program, all the work on IPM, even the work that we are proposing on the plant genome studies to identify genes which would give crops natural resistance to insects and disease or tolerance to stress conditions, is really applicable also that area.

Senator CONRAD. So you would welcome the $50 million funding level?

Dr. HESS. Well, I guess actually I would welcome, particularly if that were put in the National Research Initiative, which also does contain an area in sustainable agriculture research in addition to water quality and global climate change activities.

Senator CONRAD. I just really wanted to raise the point, given what is happening, that substantially greater commitment needs to be made.

The second item is the whole notion of commercializing the research that has been done. You have made mention of it, and as you know, we have had a bill that has been passed on the House side in various forms, it has been included over here in an original version of rural development legislation, that would include a commercialization corporation because it has been our view, based on USDA's own work, and the task force that they had, that this is a major opportunity for agriculture. What is the administration's position on the creation of a commercialization corporation?

Dr. HESS. We have some reservations about the concept of a corporation in part, and one of the questions is what is the Federal role in terms of, in relationship to the private sector. So there is some question. We are working on, again, taking your legislation and others and trying to develop a proposal—in fact, it is part of our farm bill initiative—which would try to achieve the goals that you have in a way from our perspective. And again we may have some differences, and those you will have to work out.

Senator CONRAD. What kind of funding level would you have in your proposal?

Dr. HESS. We have not, I do not believe, put a figure to this point, I do not recall we had a figure there. We were talking about the establishment of regional centers to facilitate commercialization. Again, building on the strength of the Technology Transfer Act, to provide closer working relationships between the researcher and the private sector, those sorts of things. But I do not believe we have a specific dollar figure because there is——

Senator CONRAD. Let me just rivet the point. We ought to move much more aggressively. I have just been home and met with people that are working on very exciting projects with respect to commercialization, nonfeed, nonfood uses, remarkable things that are out there, and you know who is coming over——

Dr. HESS. Yes.

Senator CONRAD [continuing]. And wants to finance it?

Dr. HESS. Japan.

Senator CONRAD. Japan. I tell you if we do not wake up on this subject, we are going to find some of the basic research that has been done in the world, done right here, is going to be taken to the commercial marketplace by our friends in Japan, and they are going to whip our pants one more time. I would really urge the administration to move aggressively and promptly. We have all the studies we need; the task force the USDA had did, I think, groundbreaking work in this area, and we ought not to let the opportunity slip by.

I was just appalled to meet with people back home. A whole series of very exciting things including the red dye from sunflower hulls, and who is there lining up wanting to finance the thing, the commercialization, but the Japanese. And our people are nowhere to be found. I just want to make that point. Thank you, Mr. Chairman.

Senator DASCHLE. Thank you, Senator Conrad. Dr. Hess, I appreciate your testimony. The only concern, I guess, I had in listening to many of the fine remarks you made is that there was no specificity with regard to some of the legislative proposals pending. Perhaps most importantly, my personal interest would be S. 2259. Have you had a chance to look at the bill and what is the administration's position or your position with regard to that legislation?

Dr. HESS. What I would share with you, I think, at this point, are my own views. The departmental position has not been developed as yet. There are areas in which I am in complete agreement, and then there are areas in which there is some disagreement, and if you wish, I will go through some of those points.

Senator DASCHLE. OK. Briefly.

Dr. HESS. One, in the opening, in some of the findings, you mentioned that ag research is conducted in areas outside of the agricultural research community. I view that as good because, in fact, part of our goal in the competitive grants program is to attract the best minds who work on research that is important to agriculture. By establishing the program areas in those competitive grants program, we can, in fact, establish what areas of research. So, in fact, we do play a leadership role in deciding the priorities there. I guess I disagree with the finding that our priority and planning process is ineffective. We have been working very hard to make the instruments that you have created in the past, the Joint Council and Users Advisory Board, much more effective. We are in the process of a strategic planning process right now to develop the next 5-year plan.

Senator DASCHLE. Could I just interrupt?

Dr. HESS. Sure.

Senator DASCHLE. Just because I am a little, somewhat confused. You said that you disagree with our statement that it has been ineffective.

Dr. HESS. Yes.

Senator DASCHLE. And you just said that you have recognized the need for some major changes in our reorganizing to make the system more effective. Did I misunderstand that or is that what you said?

Dr. HESS. That is what I said, but it depends upon the emphasis that you put on it. Ineffective is a very, I feel, strong word, saying it has not worked at all.

Senator DASCHLE. Oh, that is not what I said.

Dr. HESS. And my feeling is that in any operation, there is always ways to make it work better, and that is what I am trying to do. I think that it has been effective, but it could even be more effective.

Senator DASCHLE. So you do not disagree that there is a need for change; regardless of how we have viewed the effectiveness of the past, we are in agreement that there has to be some change?

Dr. HESS. I think there is change in the way we operate. Whether there needs to be change in the whole structure, the representation of memberships on the Users Advisory Board or the Joint Council, I would question whether that type of change is necessary.

Senator DASCHLE. OK.

Dr. HESS. I guess in the suggested structure of representation, you have the concept of adding other agencies to participate in the Joint Council, DOE, NAS, perhaps, and others. I want to mention that in the—I think it was 1981 farm bill—there was created under the FCCSET structure, a committee which is dealing—I have to try to find my—so I do not use acronyms—may I just take a second?

Senator DASCHLE. Sure.

Dr. HESS. Oh, I think I have it here. It is the Federal Coordinated Council in Science and Engineering and Technology, the so-called FCCSET committee, that is under Allan Bromley's jurisdiction in the Office of Science and Technology Policy, and he has been revitalizing that structure of coordinating activities across the agency lines, and in fact, the efforts in the global planning research program is an example of how that was put together in this current budget proposal. There was created in the 1981 farm bill a committee on Food, Agriculture and Forestry Research. It has really been dormant, and really in the spirit of your intent, I have reactivated that, and also under the spirit that Allan Bromley brings in terms of revitalizing that structure.

And members of that council include the Department of Agriculture, the Department of State, Department of Defense, Department of Interior, Department of Health and Human Services, NOAA, the Department of Energy, National Science Foundation, EPA and the TVA. We have had a meeting to help coordinate our research activities. So I think that is the mechanism by which I would address getting across-agency participation in setting priorities and coordinating research activities rather than making those individuals, or some of them, members of the Joint Council as you have suggested. So, again, recognizing the need for input, but approaching it from a different way.

I guess one area where I do have some concerns is the concept of establishing a Advisory Review Panel that would select the research proposals after they had been reviewed in the merit review process. My feeling is that the best way to do that is to carefully define the requests for proposals, the RFP's, because if you do it afterward, you really have a tremendous investment that is lost.

That is, all the time that goes into preparing the proposals, all the time that goes into reviewing them, and then after you do that, you throw out a batch of them because they do not meet the priorities that you feel they should have. I think the best place to do that is at that time you set what the grant program will be, and then you just call for research proposals that meet your needs.

As an example, in the plant germplasm study, our approach in plant germplasm or the genome mapping is different from the National Science Foundation. The National Science Foundation plans to map the entire genome of a rabbit ox's. It is a little weed that has a very short life cycle. Its genome is about the size of one human chromosome so you can map it in a relatively short period of time. Our approach is rather than trying to map the genome of cotton or soybeans or wheat is to say we will look at those traits which are agriculturally important, the genes which regulate traits that are agriculturally important. And so we will put RFPs out that say we want research that will identify those genes which are regulating drought tolerance or insect resistance, and then we are not going to specify exactly what crop that is because many times that genetic information is transferrable from one crop to another.

But that is the way we can specify our research areas at the time of doing the RFP's rather than saying everyone send in genome mapping projects and then afterward we will decide what they are doing. So there is a difference in approach there, too.

Senator DASCHLE. I am going to have to move on to another panel here. But let me just ask you about the genome project because I have some concern about it. Are you going to patent the findings of the genome project?

Dr. HESS. There is a lot of discussion right now in terms of intellectual property going on among plant breeders, geneticists, the private sector and so forth. The tendency right now is that, yes, in order to facilitate the development of genetic materials to a point where they will be commercially usable, to encourage the investment that is needed to do this research, that a patent will be——

Senator DASCHLE. But see, that investment on the genome project, Dr. Hess, is public money. So I am going to be watching this one with real care because if I see public money used in a research project that ultimately then develops into patented products where you preclude the access by other researchers or even, for that matter, by other commercial entities, from using a product developed at public expense, we may have to ensure, in law, that kind of thing does not happen. I want to caution you very, very carefully here that it is important that we separate research developed from private sources from that which is developed from public sources and which ought to be available for public utilization.

Dr. HESS. Let me speak very briefly to that point. I appreciate your concerns. On the other hand, there is another way of looking at the availability of the germplasm. That is if it is patented, it is then available. It is known. And you may have to pay a royalty to use it, but if there is no patenting system, the other approach is to not to disclose it, to keep it in a proprietary way, and so then it is not known.

Senator DASCHLE. But why should a publicly funded project be proprietary?

Dr. **Hess**. Well, what I am saying is you have, say, a private company——

Senator **Daschle**. But this is not. This is public; right?

Dr. **Hess**. What our work——

Senator **Daschle**. The genome project was publicly funded.

Dr. **Hess**. Yes. But I think you have to have legislation which is going to apply across both private and public sector research, and one of the advantages if you have uniform legislation, if one of our smaller genetic engineering firms are working in this particular area, and if there is not a proviso where there is patenting, it could well be that they would just keep that information to themselves and not make it available to others. If there is protection of the patent, then it is made available, recognizing that there may be a royalty attached. It is a complex issue.

Senator **Daschle**. It sounds to me almost like——

Dr. **Hess**. And I think it is worthy of discussion.

Senator **Daschle**. Yes. We may have to—I would not doubt if at some point in the future we will revisit the issue because I think it is worth exploring. Maybe a hearing on that alone would be helpful because I think it is a policy question that really ought to be addressed as additional moneys go into projects like this. I want to make sure that, number one, we are not benefiting specific research interests at the expense of the general public interest. I see this as a classic example, potentially. I am not saying that this is happening, but I am going to be watching that very carefully.

Dr. **Hess**. It is an issue that is worthy of good exploration.

Senator **Daschle**. Great. Well, thank you both.

Dr. **Hess**. You are welcome.

Senator **Daschle**. I appreciate it.

Our second panel is Dr. James Davidson, Dean for Research and Director, Florida Agricultural Experimental Station; and David Dyer, director of policy development for the American Farmland Trust. Dr. Davidson, we are delighted to have you. Dr. Dyer, thank you for coming. I want to be sure that everyone understands the need for the lights. I did not want to interrupt my prior panel, but we generally allot 5 minutes for oral testimony. I want to ensure that the entire text of your statement will be made part of the record, and with that, let me again invite you to proceed.

STATEMENT OF JAMES M. DAVIDSON, DEAN FOR RESEARCH AND DIRECTOR, FLORIDA AGRICULTURAL EXPERIMENT STATION, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, UNIVERSITY OF FLORIDA, GAINESVILLE, FL

Mr. **Davidson**. Thank you, Mr. Chairman.

BACKGROUND

I am currently serving as chair of the Experiment Station's Committee on Organization and Policy (ESCOP) in the Division of Agriculture of the National Association of State Universities and Land-Grant Colleges, as well as serving as dean of the research program at the University of Florida.

SECTIONS AND SUBTITLES CONTAINED IN TITLE XIV OF THE FOOD SECURITY ACT OF 1985 ARE IMPORTANT

Sections and subtitles contained in title XIV of the Food Security Act of 1985 are important in terms of guidance and funding for agricultural research, extension, and resident instruction programs in land-grant universities. These Federal legislative actions, in concert with significant guidance and funding from the State legislative bodies associated with each land-grant university, have made this Nation's agriculture the envy of the world. This success, however, may not have occurred without some cost to our environment, natural resources, and social structure.

MAJOR CHALLENGES CONFRONTING AGRICULTURE

The major challenges confronting agriculture today center on the competitiveness of U.S. agricultural products in world trade, safety and quality of the U.S. food and water supply, export/import trade and tariff policies, viability of the rural economy and the management and sustainability of our natural resources. The urgency to consider any one of these topics may vary from State to State, depending on climate, natural resources threatened, commodities grown, or rural structure, but collectively they represent the primary issues of concern to the general public today.

HOW WILL AGRICULTURE BE EVALUATED IN THE FUTURE?

Briefly stated, I believe agriculture will be evaluated in the future, not solely for its ability to produce food and fiber, but also for its ability to be competitive while remaining compatible with its environment.

If we are to appropriately and successfully address these two issues—competitive position in the world marketplace and compatibility of production systems with the environment—we must receive a major increase in funding for agricultural research. At the present time, annual appropriations of Federal and State base funds are inadequate for State agricultural research and extension programs to solve both competitive and compatibility issues while at the same time addressing the natural threats which arise unexpectedly each year. For example, Russian wheat aphid and wheat streak mosaic virus in Nebraska, the Mediterranean fruit fly problem in California, barley yellow dwarf virus and powdery mildew in Missouri, grasshoppers in South Dakota and white fly and tomato spotted wild virus in Florida.

SOLVING PROBLEMS

Solving problems such as competitiveness, availability of safe food and water supply and compatibility of agriculture with the environment will be more technology intensive than solving agricultural production programs of the past. For example, water and food safety assessments require laboratory instrumentation capable of measuring in the parts per billion and trillion as well an identification of the chemical structure and its toxicology. Biocontrol agents for pest management will likely require a tenfold increase in our understanding of the biology of such agents and their survival and action in various ecosystems before they can be effectively used. And specific disciplinary knowledge will need to be integrated into user friendly computer models for use by extension and grower groups for the development of competitive sustainable agricultural systems.

THREE RECOMMENDATIONS

Based on this, I have three recommendations for your consideration:

First, incorporate explicitly into title XIV the intent of the National Research Council Board on Agriculture report entitled "Investing in Research: A Proposal to Strengthen the Agricultural, Food and Environmental System." This proposal is the most innovative and bold plan concerning agricultural research to emerge in recent decades. The proposal has been incorporated into our State agricultural experiment station's strategic planning process. This plan was developed with input from affiliate groups in forestry, home economics, veterinary medicine, and the 1890 land-grant universities. The document describing the plan is entitled "Research Agenda for the 1990's: A Strategic Plan for the State Agricultural Experiment Stations." The agenda is the result of input received from industry, professional and scientific societies, commodity groups, and conservation and consumer groups.

Second, I wish to endorse the competitive research grant procedure for awarding and administering the new funds requested under the National Research Initiative. The knowledge and scientific capacity needed to place agriculture at the cutting edge in the 21st century is not located in any one research institution or group of institutions.

Third and final, I favor strengthening the title XIV provision for the planning and priority setting process, but not at the expense of gains made in recent years. Also, it is important that representatives from State research and extension advisory groups be represented on any proposed coalition or board to provide uniqueness associated with the States' priorities versus those of a nation or a region.

Mr. Chairman, that concludes my statement. I appreciate the opportunity to make this presentation.

[The prepared statement of Mr. Davidson appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you, Dr. Davidson. Mr. Dyer.

STATEMENT OF DAVID R. DYER, DIRECTOR OF POLICY DEVELOPMENT, AMERICAN FARMLAND TRUST, WASHINGTON, DC

Mr. DYER. Thank you, Mr. Chairman. I am David Dyer, director of policy development for the American Farmland Trust. With your permission, I would like my prepared statement to appear in the record.

Senator DASCHLE. Without objection, the entire text will be submitted for the record.

Mr. DYER. Thank you, Mr. Chairman.

PRESENTING THIS TESTIMONY ON BEHALF OF A NUMBER OF GROUPS

I am presenting this testimony on behalf of a number of groups that have worked together to generate a set of proposals for the farm bill legislation. Many of the specific proposals are in the prepared text. In addition to the American Farmland Trust, these groups include the Center for Resource Economics, the National Audubon Society, the Natural Resources Defense Council, the National Wildlife Federation, the Sierra Club, Public Voice for Food and Health Policy, the Institute for Alternative Agriculture, the Consumer Federation of America, and the Soil and Water Conservation Society.

This testimony speaks to our common goals and recommendations. It does not attempt to answer every question about particular allocations of funds.

FOUR POINTS CONCERNING RESEARCH, EXTENSION, AND TEACHING NEEDS

Mr. Chairman, I will attempt to make four points quickly concerning our proposal. Three of them, I think, are adequately addressed by many of your other witnesses. The fourth is not.

First, we need more funding to construct a solid and technical foundation for widespread adoption of environmentally sound farming practices to produce safe food and preserve water quality and allow farmers to earn a profit.

Second, more funding should be devoted to integrated systems research that provides a view of farming operations as more than a collection of unrelated parts.

Third, in an era of tight budgets, existing funds should be redirected to high priority national research and extension needs. To cite a few high priority demands for funds, I would cite the Integrated Pest Management programs and particularly those IPM programs that stress the use of biological controls. A second high priority need would be the funding of sustainable agricultural research projects under the Agricultural Productivity Act. Senator Conrad was referring to those projects in terms of the limited funding that has been available to that act since its adoption in 1985. The fact that Senator Leahy is now the chairman of this committee, and that was one of his proposals in 1985, gives me some optimism about funding in the future. Also expanding the technical assistance capabilities of the research delivery agencies such as the Extension Service and the Soil Conservation Service.

The fourth point that I would like to make is one that was not made by earlier witnesses. Research and extension efforts by themselves will not solve many of the problems facing agriculture and the environmental concerns today. Without new policies that directly address these problems, we will not see significant progress in controlling erosion, curbing ground and surface water problems of contamination, protecting natural resources, and achieving farm profitability.

ADEQUATE FUNDING IS NECESSARY TO BUILDING A SOUND RESEARCH AND EXTENSION SYSTEM FOR THE FUTURE

In terms of adequate funding to build a sound research and extension system, we believe that additional support is necessary because funding for these programs has not kept pace with the demand for new knowledge that farmers and ranchers have generated. Several other witnesses have pointed out to the subcommittee a need for additional funds. Not enough is being done to help producers with either the short-term or the long-term concerns. Failing to keep up with market shifts, environmental concerns or any of a myriad of other day-to-day changes, can spell financial disaster for producers. Failing to operate the farm or ranch with an eye to the sustainability of that enterprise can, over time, be a calamity for both the landowner and the Nation.

Many proposals for this additional research funding will be discussed in this committee and perhaps more vigorously in the Committee on Appropriations. Several proposals have been put forward concerning where new funding is needed.

MORE SYSTEMS RESEARCH IS NEEDED

Additionally, more systems research is needed. Not enough research or technical assistance is available for farmers and ranchers who wish to modify their production systems for maximum environmental benefits. A North Dakota producer is on the next panel, I think, who will cover that point in greater detail. He does quite a good job on his own farm. Underfunding is strangling interest in researching ways to achieve practice farming systems.

One specific recommendation we would have is that matching funding for the agricultural productivity research programs can help. Many States and some private organizations, including the American Farmland Trust, have undertaken research and demonstration programs. We try to show farmers practical ways to increase their farm profitability while being environmentally sensitive in their operation. We have undertaken such work in Illinois and we intend to work this year in Indiana and Missouri at the request of those States.

MORE THAN RESEARCH IS NEEDED

Let me turn quickly to one last point. More than research is needed.

Research and dissemination of useful research results are necessary components of a successful agricultural production and marketing system in the future. But research is simply not enough.

To achieve meaningful progress in protecting both agricultural profitability and the environment, more direct steps must be taken to modify farming practices. These steps include: strengthened enforcement of existing environmental laws, better recordkeeping, and a reform of commodity program provisions. The marketing and distribution of farm products can be improved by stressing nutritional value rather than appearance, certifying and correctly labeling organically produced food, and allowing the market signals about such foods to flow back through the marketing system to the growers. And long-term protection of the natural resource base of the United States should be the foundation upon which we build our progress.

Mr. Chairman, thank you for the opportunity to express our views.

[The prepared statement of Mr. Dyer appears at the conclusion of the hearing.]

Senator **Daschle**. Thank you, Dr. Dyer and Dr. Davidson, for excellent testimony. Given the hour and the need to be somewhere else in a short period of time, I will forgo questions, but I will ask that the hearing be held open for a number of days in order for us to submit some written questions to you, and with that, let me express our thanks for your presence and for your excellent comments.

Mr. **Dyer**. Thank you, Mr. Chairman.

Senator **Daschle**. Our final panel will be comprised of Dr. Donald Uchtmann, the director of the University of Illinois Cooperative Extension Service; Dr. Frederick Kirschenmann, a farmer from Windsor, North Dakota; and Mary Grim, the Chair of the Committee on Agricultural Research, Extension and Teaching (CARET). If those three witnesses will come before us, we will take their testimony at this time. We are pleased you are with us. We know that in all three cases, you have come a good distance to be here. We appreciate that immensely. We would invite your testimony in any way you see fit. The entire text of your prepared statement will be made a part of the record. And let us begin with you, Don.

STATEMENT OF DONALD L. UCHTMANN, DIRECTOR, UNIVERSITY OF ILLINOIS COOPERATIVE EXTENSION SERVICE, AND ASSOCIATE DEAN, UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE, URBANA, IL

Mr. **Uchtmann**. Thank you, Mr. Chairman. I am Donald Uchtmann, director of the University of Illinois Cooperative Extension Service, and associate dean of the College of Agriculture at the University of Illinois.

VIEWS AS TO THE FUTURE OF THE COOPERATIVE EXTENSION SERVICE

In my oral remarks, I would like to concentrate on three things:

First, what is happening in Illinois CES, the cooperative extension system in Illinois.

Second, how does what is happening in Illinois reflect, in my judgment, what is happening throughout the system?

Third, I would like to provide a State director of extension's perspective that I think Congress needs to understand as it considers legislation in the 1990 farm bill. Regarding all of these points, I am attempting to be responsive to your invitation to express my views as to the future of the cooperative extension system in this country.

FIRST, WHAT IS HAPPENING IN ILLINOIS CES

First, what is happening in Illinois CES. We are on the move. We are changing. We are adapting, and we are in the midst of some very exciting transformations. For example, our programs are being driven more and more by issues that are perceived to be real and important to the citizens of Illinois and the Nation, and less and less by historic pattern. The cooperation between extension and research in the State of Illinois is clearly increasing. Not only is there more contact among the directors, between the directors of those two important arms of the College of Agriculture, but that interaction is taking place at an increasing level all the way through to the front line of our respective organizations.

We have, for example, taken an extension specialist, Don Kulman, and named him to be the extension and research—repeat, extension and research—program leader for environmental issues. Another person was taken out of extension to be extension and research program leader for sustainable agriculture. A third person was taken out of extension and is now working as an assistant director in the agricultural experiment station dealing with the development of the science of agricultural ecology. We are reaching out more and more to the entire university, recognizing that the research and teaching base that we have within our College of Agriculture, excellent as it is, is probably not sufficient to deal adequately with the whole range of science and education issues that we must address in the next decade and the next century. We are rebuilding ourselves, quite literally rebuilding ourselves, for the decade of the 1990's and the next century.

IS ILLINOIS INDICATIVE OF WHAT IS TAKING PLACE THROUGHOUT THE SYSTEM?

Now, is what is happening at Illinois indicative of what is taking place throughout the system? I think it is. I would observe, for example, that California is perhaps one of the most, if not the most, leading State in the integration of extension and research at the operational level. Nebraska, for example, has been working very hard at developing specializations within their cadre of agents so that they can better deal with the exploding knowledge base that extension agents are expected to deal with. They are doing this through a concept of clustering in which agents come together and work more as teams bringing individual specializations to bear on the problems that they are confronted with.

Missouri, like Illinois, is developing a plan for a modern, sustainable, local presence with probably some changes in the funding contributions of the partners. South Dakota has recently increased its State support for extension. It has a new director, a delightful man with energy and ideas who is going to be contributing to the evolving progress of our system.

A STATE DIRECTOR'S PERSPECTIVE ON THE SYSTEM

Let me now turn to a State director's perspective on the system, and let me pose a question. Do directors have an important perspective regarding the cooperative extension system that Congress needs to understand? My answer to that would be an emphatic "oh, yes."

For example, it is terribly important to recognize that the cooperative extension system is a partnership amongst Federal, State and local entities and is in that way very much different from most of the agencies of the Department of Agriculture. It is also important to recognize that in a funding sense, the role of the Federal partner in this partnership has declined. If we looked at the last comparative data that I have, for example, fiscal year 1988, the Federal contribution to the extension program in Missouri and South Dakota was approximately 38 percent of their total investments in their extension program. In Nebraska, it was about 26 percent. In California, it was about 17 percent. In Illinois, we are at 38 percent. We are projecting the Federal contribution will drop to 28 percent by the year 2000, and if we are successful with the major State funding initiative for extension, it will drop down to 20 percent.

The system is changing rapidly. Important differences are taking place within the different States. Even within a State, there are dramatic differences in the way in which extension operates within a given region of a State.

CES EDUCATIONAL PROGRAMS GENERALLY HAVE TREMENDOUS CREDIBILITY

A third point, CES educational programs generally have tremendous credibility, in my judgment—tremendous creditability—because we make an effort to assure that they are based on science and research to the best extent we can. It is terribly important that the content of our programs continue to be based on science and research and influenced as little as possible by pure politics.

COMPETITIVENESS AND SUSTAINABILITY OF THE AGRICULTURAL SECTOR

With regard to competitiveness and sustainability of the agricultural sector and of our country, we recognize the importance of the relationship among basic research, applied and adaptive research, extension and contact with the end users. We believe that it is terribly important to keep the links of those important elements of this chain strong. I believe in the validity of the National Initiative, and think that it can contribute to competitiveness in American agriculture. But I do not believe that it should come at the cost of the underlying infrastructure that involves not only basic research but also applied and adaptive research and extension.

CES SHOULD BE RECOGNIZED IN THE FARM BILL AUTHORIZATIONS

CES should be recognized in the farm bill authorizations. It should receive Federal funding. We have witnessed a trend in which Federal support for the infrastructure of our science and education system has been declining. Let the 1990's be the decade in which that trend is reversed. Thank you, Mr. Chairman.

[The prepared statement of Mr. Uchtmann and attachment, "Program Examples" by Peter D. Bloome, appear at the conclusion of the hearing.]

Senator DASCHLE. Very well said. Thank you. Dr. Kirschenmann.

STATEMENT OF FREDERICK KIRSCHENMANN, FARMER, WINDSOR, ND

Mr. KIRSCHENMANN. Thank you, Mr. Chairman. I, too, want to express my appreciation for being invited to share some concerns about the research agenda.

My name is Frederick Kirschenmann, and I make my living managing a 3,100 acre grain and cattle farm near Windsor, North Dakota. In 1977, we switched our operation to alternative methods and have continued to operate our farm by those methods, and successfully since then.

For a variety of reasons, primarily because of the growing number of farmers who have expressed interest in these alternatives, I have also become involved in a variety of other activities, notably an involvement in a farmer-to-farmer network existing out in North and South Dakota called the Northern Plains Sustainable Agriculture Society.

SINCE 1979 TRYING TO FIND BETTER WAYS TO MAKE THESE ALTERNATIVE SYSTEMS WORK

We have since 1979 been working together to try to find better ways to make these alternative systems work on our own farms. I have also become involved in a private research program in the Michael Fields Agricultural Institute in East Troy, Wisconsin, which is doing on-farm research in these methods and trying to help farmers to adapt them in their own operations. And also I have been involved with land-grant colleges, particularly in North and South Dakota. The reason for mentioning these things is because it has given me an opportunity to view some of the impact of our research agendas, both on researchers and on farmers. And I would like to concentrate my comments from that perspective this morning.

INVESTING RESEARCH FUNDS—KEEPING IT POSITIVE AND NOT NEGATIVE

I think we are all aware that the last 40 years, the lion's share of the agricultural research has been directed toward high-input, capital intensive agriculture, and we are all aware of the benefits which that research has provided for us all, but I think we are also becoming aware now that there is a definite downside to that particular approach to agriculture, and part of that downside is experienced by farmers because it has involved us in the kind of agriculture that has created an enormous erosion of farmers off the land and consequently disappearance of rural communities. And contrary to some popular opinions now, that erosion has not ended. Just in the last 4 weeks, we have seen a new round of farm auctions in my community, and the word around town is that the primary reason for those auction sales is because farmers cannot acquire the necessary credit owing to their financial status to plant a crop this spring.

So somewhere along the way, we have to turn that around, and in my experience, a rapidly growing number of farmers are realizing that there is an alternative, and they want to utilize that alternative on their own farms.

IOWA UNIVERSITY POLL

The Iowa University poll indicated that 56 percent of the farmers interviewed indicated that they would be interested in utilizing some alternative methods on their farms if they had more information.

GAO REPORT

The General Accounting Office's report on Alternative Agriculture, which came out just a few days ago, indicated that farmers they interviewed had some reservations about moving in this direction because they are afraid that they may have some problems with weed control or they may have reduced profitability, et cetera, and the conclusion of the GAO is, and I quote, "Unless research and on-farm demonstration convince farmers that these are not problems, movement toward alternative agriculture will be slow." It is *information* which is the key thing that they are saying and that farmers are saying is what we need.

LISA

So I think we need to redirect our research into these areas. I think that already the early results of the fledgling LISA project that we have funded—which comprises less than one-half of 1 percent of USDA's research budget—indicates that this approach is successful. Let me just cite a couple of examples. South Dakota State University with the help of some of the LISA funding has already established that properly managed low-input farming systems in many instances are *more* profitable than the conventional systems. Farmers need to know that.

CARRINGTON RESEARCH EXTENSION CENTER

At the Carrington Research Extension Center in North Dakota, researchers have already found that one can utilize up to 50 percent crop residues in feeding operations in livestock, enabling grain farmers to include livestock operations in their farming systems in a profitable manner. And that, like so many LISA projects, has a double benefit in that it not only helps farmers to add an enterprise, a profitable enterprise, to their operation, but also begins to return some livestock to the land, which, in turn begins to deal with one of the key problems of environmental pollution caused by animals under the present system.

THE DESIGN OF THE PROGRAM IS BRINGING FARMERS AND RESEARCH AND EXTENSION TOGETHER ON FARMS DOING RESEARCH TOGETHER

So these are the kinds of things that are happening out there as a result of a very small amount of money that has been put into the system. There are many other examples which I could cite, if we had time. But quite apart from this kind of data which is emerging out of this kind of research, there is another thing that is happening out there that is probably even more important, and that is that the design of the program is bringing farmers and research and extension together on farms doing research together.

We now have researchers and farmers that have not talked to each other for 25 years doing research together, learning from each other. The researcher is learning from the experience of the farmers, and the farmer is learning from research and extension. That is an explosive combination, and it is going to help to change agriculture.

WE DO NOT HAVE ADEQUATE FUNDS TO FULFILL ITS POTENTIAL

I am also serving on the North Central LISA Administrative Council, and the difficulty that we are having is that with all of the potential that this program has, we do not have adequate funds to fulfill its potential. Let me just give you a concrete example. In January, we received in the north central region 206 preproposals. Out of those we selected 47 and we are all agreed that all 47 of those projects are very deserving of funding, and could help to achieve some of the things that we all want to achieve for agriculture: safer food, preserving the resource environment, protecting the environment.

But out of those 47 proposals, if we were to fund them all—and we are all agreed they are all deserving—it would take $6.8 million, and in the north central region, we have $875,000 to allocate toward those projects. That means that probably at best, we are going to be able to fund six or seven of those projects. On June 3 and 4, we are going to select the 6 and 7 out of those 47. It is going to be the toughest decision I have ever participated in, and I think it is a tremendous waste of human resources that we are not able to allow these people that want to do this research to support them so that they can do it.

COMMEND YOU FOR THE LEADERSHIP

I want to commend you for the leadership that you have given in trying to redirect some of our approaches and I assure you there are a lot of farmers and researchers out there that are waiting for this new direction to take place. Thank you.

[The prepared statement of Mr. Kirschenmann appears at the conclusion of the hearing.]

Senator **Daschle**. Thank you, Dr. Kirschenmann. I intend to share your last few comments with my colleagues. I think that really epitomizes the problem we are facing. You have viable research needing to be funded, and the money just is not there. And as a result, some of these projects probably will never be funded as a result.

Dr. Grim.

STATEMENT OF MARY C. GRIM, CHAIR, COUNCIL FOR AGRICULTURAL RESEARCH, EXTENSION AND TEACHING (CARET), EAST BERLIN, PA

Mrs. **Grim**. Thank you, Mr. Daschle, for the opportunity to appear here today. I would first like to correct the record. I am not nor have I ever been Dr. Grim. Just Mrs. Grim will be sufficient.

Senator **Daschle**. Mrs. Grim, could you hold for a second. the Majority Leader is on the line for me so I will be right back.

[Recess.]

Senator **Daschle**. Please proceed.

Mrs. **Grim**. Again, I am not Dr. Grim. Just Mrs. Grim. And I am here today serving as chair of the Council for Agricultural Research, Extension and Teaching, more commonly known as CARET.

CARET

Just briefly, CARET is a national grassroots organization of volunteer leaders who work closely with their land-grant schools in developing programs and priorities to meet the needs of the people within that State or locality. We represent the full spectrum of the agricultural community. When CARET speaks about agriculture, we speak in terms of agriculture in its broadest of senses. We are the consumer. We are the homemakers. We are the farmer. We are the industrial section. We are the processor and the agribusiness person as well as local and State officials, who are big partners in the land-grant system. We serve as supporter of, adviser to, and friendly critic of the land-grant system.

REQUEST THAT AGRICULTURAL RESEARCH AND EDUCATION PROGRAMS BE GIVEN A TOP PRIORITY BY THE FEDERAL PARTNER

I am here today to request that agricultural research and education programs be given a top priority by the Federal partner in this relationship. With the continued strong support of the Federal Government, we will be better able to improve the economic and social well-being of America.

However, I remind Congress that it is the grassroots beginning of that research and educational process that has enabled America to respond and to be the leader that it is today. Everything is not doom and gloom out there for the agricultural community. Local level users across America take seriously the mandate to look at their communities and to develop programs and priorities within that local area to best address the needs of their fellow citizens. This information is then fed into a statewide network where then State priorities are established and resources are allocated to meet the needs of the State. From that State level, then, we do feed into a national pipeline process where then priorities are established. I would encourage Congress to see that this programming network, which involves establishing priorities at all levels, continues for this partnership *is* more than just a funding source. It is a program planning process.

PROCEED CAUTIOUSLY TO CHANGING OR MODIFYING THE PRIORITY AND PLANNING PROCESS

We recognize the proposals that have been made in reference to changing or modifying the priority and planning process, and we hope that you will proceed cautiously in this area as you consider these revisions because any decisions you make here have a direct effect in my kitchen in my home. The issues that have been identified, and I will not repeat them—they are outlined in my written testimony—such as food safety, integrated pest management, enhancing animal health and welfare issues, we consider all these issues and the relationship to title XIV very important, and I trust the Congress will not get caught up in the excitement of the times, but continue to look ahead to the future as we designate new directions and recognize that the land-grant system has already been doing work in these areas.

EXAMPLE

That is why, to use one example in my home State of Pennsylvania in Adams County where I come from, the use of Alar was used many years ago by our fruit producers. My county is the largest fruit-producing county in Pennsylvania. However, more than 5 years ago, because of the research and education process of our land-grant system, our producers were instructed on alternative uses to that specific chemical and other chemicals. They have actively used the Integrated Pest Management Program, and working both with industry and with our research and education community when recent scares crossed our Pennsylvania TV's, our local producers were able to respond and assure the people that Pennsylvania apples were safe to eat and Pennsylvania apple juice was safe to consume. In multiplying each States's efforts in similar programs, this can lead to an increased understanding of how safe our food supply is and alleviate the consumer's fears.

Additionally, all our land-grant system stands ready to instruct the consumer on the meaning of such terms as "parts per trillion," "risk versus benefits," "leeching," et cetera, and how that translates to a safe food supply.

These are all terms that are new to us out in the grassroots area. We need to be taught what they mean and what relationship they have to our everyday living.

I will not list for you the seven areas which I have suggested be maintained as high priority areas. [See pages 687 to 688 for the seven areas.]

LAND-GRANT SYSTEM WORKS AND RESPONDS TO OUR NEEDS AT THE GRASSROOTS LEVEL

I do not appear here today to just simply "rubber-stamp" business as usual in the land-grant system. The land-grant system is dynamic and constantly changing. It does meet the needs of the people. It does work because of its grassroots beginnings, and I hope that even though it is not perfect, we continue to work on it and make it better. We work with people with USDA. We work with the Cooperative Extension Service in helping to redirect resources, and hopefully can help to alleviate the concerns that are arising faster than what we have resources, meaning dollars, to conduct the needed research in those specific areas.

Again, thank you for allowing us to appear here. Our organization would be more than happy to respond at any time.

[The prepared statement of Mrs. Grim appears at the conclusion of the hearing.]

Senator DASCHLE. Thank you, Mrs. Grim. I appreciate your comments and that of your two colleagues on this panel.

This has been an interesting series of hearings, and I have certainly learned a good deal. We also have for the record several written statements that without objection will be included in the record.

[The prepared statements of Mr. Block, Dr. Walker, and Dr. Clarke appear at the conclusion of the hearing.]

Senator **Daschle**. I do not know that we want to throw out the system at all. I think all we want to do, like you, is build upon it, find ways with which to improve it, especially with regard to making sure that what research is being funded is provided to those who can use it the most, and as we continue to face an ever-changing world, that challenge becomes even more significant.

And so you have given us some insight here that has been very helpful, and I appreciate it very much. With that, the hearing is adjourned.

[Whereupon, at 12:05 p.m., the subcommittee adjourned, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

APPENDIX

Prepared Statement of Charles E. Hess, Assistant Secretary for Science and Education, U.S. Department of Agriculture, Washington, DC

Good morning Chairman Daschle and members of the subcommittee. I appreciate the opportunity to appear here this morning to discuss the administration's science and education proposals for the 1990 farm bill. These are contained in S. 2292 which has been introduced by Senator Lugar.

In preparation for enactment of the new farm bill, we have considered the impacts on agriculture of those social, economic, political, and technological changes which have occurred in the United States and throughout the world in the past 5 years. And, we have tried to anticipate the needs of the agricultural sector during the next 5 years.

Based upon this review, we are proposing legislation in six areas—amendments to the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and related acts—which we believe will serve the interests of American agriculture not only during the life of the new farm bill, but well into the next century.

The National Research Initiative is one of our proposals which has long-range benefits. The 1989 report of the National Academy of Sciences, "Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System," pointed out the urgent need to revitalize agricultural research.

In the fiscal year 1991 budget request, we have requested $100 million to fund the first year of this national initiative. To the extent that funds are awarded competitively and not earmarked for special purposes, the administration is also proposing that funding for this initiative be increased by $50 million annually throughout the outyears. We are also anxious to hold the line on earmarking throughout the Federal agricultural research system.

In order to carry out the National Research Initiative in Agriculture, Food and Environment, we are proposing language for incorporation in the 1990 farm bill to eliminate the funding cap on the competitive grants program by amending section 2(b) of Public Law 89-106.

There has been a heightened recognition in recent years of the need to increase the diversity of students in agriculture to expand the pool of talent for research, teaching and other positions in this field. We are already taking some of the important steps in this area through our 1990 and 1991 budget and program proposals. We also believe that expanding the availability of competitive research funds in agriculture will help attract young men and women into careers in the agricultural sciences.

Mr. Chairman, in the past 5 years there has been a growing interest in sustainable agricultural practices. A sustainable agriculture generally means an agriculture that, for the foreseeable future, will be productive, competitive, profitable, conserve natural resources, protect the environment, and enhance public health and safety. In short, we define sustainable agriculture as a system that is economically viable and environmentally sound over the short and long term.

Conventional agriculture carried out over the last several decades has brought impressive gains in production through highly specialized, intensive farming practices. Many have come to believe that those gains have sometimes come at the cost of unforeseen adverse environmental effects.

The Low-Input Sustainable Agriculture (LISA) program has provided a good foundation on which to build, and indeed, the administration has requested that it be funded in fiscal year 1991. For the 1990 farm bill, however, we are proposing changes to Subtitle C of the National Agricultural Research, Extension, and Teaching Policy Act Amendments of 1985 in the 1990 farm bill that will help develop and encourage sustainable practices, and that will promote full participation of the entire agricultural research community. Other proposed revisions, though not contained in the research title, would modify program requirements to allow new flexibility in crop bases to protect the crop base of producers who plant legumes, grasses, or conserving crops as a part of a sustainable agriculture rotation. Secretary Yeutter and others have described these proposals in some detail at various congressional hearings over the past few weeks.

It must be pointed out that the United States is not alone in its interest in sustainable agriculture. Last month the Department of Agriculture was among the sponsors of an International Workshop on Sustainable Land Use Systems.

That conference, in New Delhi, India, was attended by representatives of 19 nations. The scientists and agricultural administrators from these countries agreed unanimously that future agricultural practices must become more environmentally sensitive without impairing the ability of the farmer to make a living, or without diminishing the production of food and fiber required for a growing world population.

The legislation we are sending to Congress for its consideration will serve to promote the adoption of sustainable agricultural practices and demonstrate the commitment the Department is making to this effort.

The environmental and health issue is also addressed in four other areas of our farm bill proposals:

—water quality,
—food safety,
—global climate change, and
—environmental and natural resources education.

Our water quality proposal is designed to support President Bush's Water Quality Initiative which was announced in his fiscal year 1990 budget and which called for an intensive commitment by Federal agencies to curbing water pollution related to agricultural chemicals. The initiative included a request for $290 million in water quality expenditures by Federal agencies, including the Department of Agriculture in fiscal year 1990. Congressional action on the funding request has been favorable, and we are in the process of implementing the 1990 program and planning for further expansion of this initiative in the upcoming years.

There are two science and education components relating to the initiative contained within our farm bill proposal, one relating to research and education, and the other to the U.S. Department of Agriculture's technical assistance program. As indicated in the Environment and Health section of title VII of USDA's background report on the farm bill, the "green book," we are not seeking new authorities for water quality in the research and education title. Current legislation provides ample authority for our research and education program. We are, however, proposing to underscore our commitment to improving water quality through specific language in the new farm bill.

The research and education agencies of USDA in conjunction with the conservation and commodity agencies have developed a comprehensive implementation strategy for the USDA Research Plan for Water Quality. This plan's basic goals are to provide an understanding of how current agricultural practices contribute to ground water contamination, to provide technical assistance and incentives to adopt alternative systems, and to develop alternatives to current management systems that will reduce potential ground water pollution by agriculture without sacrificing profitability. The plan is being implemented, using the current best management practices, which will be modified as new research information is available and followup evaluation is scheduled. We believe our farm bill proposal underscores our efforts in this area.

Another area of concern today is the need for increased emphasis on food safety research and education. We are proposing specific farm bill language which will provide for the Department to have a more active role in research and education programs related to food safety by developing agricultural production and processing practices and systems that are economically viable while at the same time are protective of the Nation's food supply.

Our food safety program will also provide timely education and assistance to farmers, ranchers, and food processors so that improved practices may rapidly replace those found to be less than acceptable. We also propose to have the Extension Service provide educational programs for consumers on food safety, and to assure that food safety activities be fully coordinated.

Mr. Chairman, we are also asking that the new farm bill include a provision defining the Department's continuing role in research and education related to global climate change: evaluating the effects of agriculture and forestry production, processing, and transportation on the global environment, the effect of potential global changes on those agriculture and forestry industries, and ways in which agriculture can contribute to reduced greenhouse gases through photosynthesis and being a source of industrial hydrocarbons.

We are also seeking to meet the need for development of economically viable measures for limiting or mitigating the emission of "greenhouse" gases and for adaptive strategies, including technical assistance and education programs, to cope with global changes that may occur.

The Department of Agriculture is currently carrying out a number of environmental and natural resources educational activities in connection with a variety of programs. While the authority for these activities is implied in various legislative acts, there is no specific statutory language giving the Department the executing role. Thus, we are asking that the farm bill include language to clarify the Extension Service's important role in the education of the public on natural resources and environmental issues.

I would now turn to another area which has generated much interest in the agricultural community, the media, and the Congress, and on the part of the President—the need for finding new industrial uses for agricultural materials and encouraging their commercialization.

From its very beginning, the Department of Agriculture has been involved in research and development of new products. Yet, in recent years we have begun to realize the tremendous potential which exists in researching and developing nonfood, nonfeed uses of agricultural commodities. Oilseeds can be used to replace imported petroleum products, newsprint can be made from kenaf, and biodegradable bags can be manufactured from starch. Thus, not only can we open new markets for American farm products, but also we can assist in cleaning up the environment and protecting natural resources through the development of industrial materials from agricultural products.

We will target the use of public resources in cooperating with the private sector as it assesses the commercial potential of these new products. The Agricultural Research Service (ARS) and the Nation's land-grant institutions are frequently able to identify potential products, but additional developmental research may be required in order to bring them to the marketplace. We will make effective use of public talent in promoting successful technology transfer. I believe you will find our proposal to be sound, and one which can have a positive effect on agriculture in the years to come. I should note that we are providing additional language to "flesh out" our proposal in S. 2292.

Mr. Chairman, at the beginning of my remarks, I mentioned our changing world. Certainly as we look at what is happening in Eastern Europe and Central America, we realize just how much it is changing. Nations which once were locked behind the Iron Curtain are emerging into the sunshine of freedom and democracy. Many of these countries need help in rebuilding their agricultural economies in order to provide adequate food supplies to their people, and to generate the income necessary to be viable in the world marketplace. As their economies strengthen they will become important trading partners for the United States. We believe that the Department of Agriculture can make an important contribution through international cooperation in research, extension, and education.

We must also recognize the needs and concerns of the developing nations of the world, and we will continue to cooperate with the Agency for International Development to meet those needs. Additionally, we must continue to work with the developed nations of the world in the pursuit of our mutual interests.

U.S. participation in these international activities is important for two reasons: the skills and talents of our agricultural scientists can help speed the process of development in many countries of the world, and the information and knowledge to be gained by these same scientists can be of inestimable value to American agriculture. Such participation also provides access to germplasm which is critical to U.S. agriculture since most of our commodities originated overseas.

Our farm bill proposal draws upon the Federal system and the land-grant system to meet the research and educational needs and challenges posed in today's world. This proposal would emphasize the importance the Department attaches to international activities.

Our final proposal deals with an issue of great importance to the agricultural research community—and to the future of agriculture: germplasm conservation and genome mapping.

The USDA has been a leader in research to increase the production efficiency of plants and animals and to improve their nutritional quality. The need to collect and distribute the genetic resources necessary for this important work has long been recognized. In 1946, legislation was enacted to establish cooperative State and Federal plant introduction stations, and the National Seed Storage Laboratory was authorized 10 years later, leading to the core of what is now the National Plant Germplasm System—genetic collections of useful economic crops, potentially useful new crops, and microbial stocks of use to agriculture and industry—in laboratories across the country. The ARS is the lead agency in this endeavor.

As a part of the National Research Initiative, the President's FY 1991 Budget proposes to initiate a major plant genome mapping program to decipher the genetic instructions that guide the development of important traits in food and forest plant species. Such a multiyear program is essential for the United States to maintain and strengthen its global position in agricultural efficiency and profitability.

We are proposing to include specific language in the new farm bill establishing this program, and to assure that USDA's program is fully coordinated with other Federal and State agencies and the private sector in a national effort to preserve and document the valuable plant, animal, and microbial germplasm in the genebanks within the United States.

Mr. Chairman, that concludes my statement. I welcome questions from the members of the subcommittee.

STATEMENT OF CHUCK HASSEBROOK

OF THE

CENTER FOR RURAL AFFAIRS AND SUSTAINABLE AGRICULTURE COALITION

BEFORE THE

SUBCOMMITTEE ON AGRICULTURAL RESEARCH AND GENERAL LEGISLATION

MARCH 29, 1990

Mr. Chairman and members of the Committee, thank you for the opportunity to testify before you this morning. The Center for Rural Affairs is a research and advocacy organization based in Walthill, Nebraska. Since 1976, we have been engaged in on-farm research in Northeast Nebraska, working with small farmers exploring means to reduce energy and input purchases to improve their incomes. More recently we have examined key issues in agricultural research policy, in our reports _Path Not Taken_, on the influence of private grants in leveraging use of public research funds and _Choices for the Heartland: Alternative Direction in Biotechnology and Implications for Family Farming, Rural Communities and the Environment_. I will also speak this morning on behalf of the Sustainable Agriculture Coalition, which is composed of twelve midwestern grassroots organizations which work directly with farmers practicing sustainable agriculture.

Let me begin, Senator Daschle, by praising you for the leadership you have provided by introducing S 2259. As I have said in the past before this Subcommittee, agricultural research is, in a sense, a form of social planning. Decisions about how agriculture research dollars are used and which farming systems and technologies are developed and ultimately put to use on farms profoundly shape the environment and life in rural America. S 2259 recognizes that and would direct federal agriculture research funds toward development of farming systems and technologies which would enhance rural life and environmental quality.

In the past, public agricultural research priorities have been established without consideration of broad societal goals and impacts. As Dr. Vernon Ruttan, Regents Professor at the University of Minnesota, observed:

> Agronomists and other agricultural scientists, along with engineers and health scientists, have been the true revolutionaries of the 20th century. But they are reluctant revolutionaries. They have wanted to revolutionize technology but have preferred to neglect the revolutionary impact of technology on society. (_Choices, Third Quarter, 1987)_

That is not to blame individual scientists, for they have not been provided the tools to address these issues. Social goals must first be set by representative bodies and incorporated in policies and procedures by USDA to provide the framework through which scientist might direct their work. Congress did move in that direction in the 1985 farm bill by directing USDA to develop extension plans with particular emphasis on addressing the unique needs of small and medium sized farms and expressing its sense that USDA research, extension and teaching funds be directed toward technology that can be used effectively by small and medium sized farms. However, USDA has responded with no systematic procedures for considering whether the results of particularly research and extension projects could be effectively used by small and medium sized farms. Nor has USDA responded with any systematic efforts to emphasis their unique needs in extension programs generally. In Nebraska, however, the Extension Service did sponsor special programs addressing the challenge of managing employees on large farms.

The absence of a clear set of guiding purposes for publicly funded research is most glaring in the emerging science of biotechnology. Cornell University Sociologist Dr. Fred Buttel, who has published widely on the effects of biotechnology on land grant institutions, observed in 1986 that most land grants had not established even clear agronomic goals for their biotechnology research programs. Since then some land grants, to their credit, have begun to define those goals. The University of Maine has established a policy of directing its biotechnological research toward sustainable agriculture. Iowa State University, as a result of the efforts of its Bioethics Program, has began to ask researchers requesting money from its special biotechnology research fund to anticipate the social and environmental impacts of the proposed research. Commendable as these examples are, however, there remains no clear and effectively implemented national policy on the purposes to be served by publicly funded agricultural research. The absence of such guiding purposes leaves public institutions vulnerable to influence by small private grants and contracts, the result of which is that public funds are sometimes used to serve private rather than public interests.

The advent of biotechnology increases the importance of setting research goals and priorities and presents us with new sets of choices with respect to research directions. Weed control presents an interesting example. No single applied area of biotechnology research has to date attracted more combined private and public expenditure than development of herbicide tolerant crop varieties, to increase the variety, number and rates of herbicides which can be applied to a given crop. What might be the expected impacts of such research?

We anticipate that it will counter the trend toward reduced reliance on herbicides and accelerate the decline of moderate sized farms. In Nebraska, according to the extension weed specialist, there is growing interest among farmers in abandoning broadcast application of herbicides in favor of applying the product in a narrow band over the rows, while controling weeds between rows mechanically. If these varieties make more perfect chemical weed control achieveable, cultivation might be eliminated in favor of total reliance on broadcast application of herbicides. While the research has been touted by industry as enabling more widespread use of newer and ostensibly safer herbicides, it is important to note that it has focused on a wide range of herbicides including the problematic atrazine, now widely found in rural wells.

The economic benefits of this research are elusive. The so called newer and safer herbicides by which the research is justified, such as Roundup, are among the more expensive. It would appear that the principal economic benefit might be to enable one person to farm more acres, by eliminating cultivation.

The important question to ask is whether this research is the best use of scarce public research funds, relative to alternative directions. For example, might we contribute more to environmental and family farm objectives by developing farming systems and crop varieties less dependent on herbicides. For example, development of faster germinating and emerging crop varieties would enable crops to get a jump on weeds, which would allow for more effective mechanical weed control. This would enable the 500 acre farmer to improve his/her income by reducing input purchases. It would enhance the role of people in agriculture and keep more of the farm dollar in the farmers' pocket. It would reduce the release of herbicides into the environment.

The problem from a policy perspective, is that the broad impacts of alternative research directions are not systematically examined by USDA or land grant institutions in setting research priorities. Similar questions need we raised in many areas of research. For example, should research to develop new uses for farm commodities focus on the existing major crops, or prioritize soil conserving and rotation crops which enhance sustainability? Should research in hog production focus on the stresses and management constraints of large scale total confinement systems, or those of moderate investment systems more accessible to small and beginning farmers?

S 2259 provides the policy frame work to ask and answer these questions. It sets the over arching purposes for agricultural research in the Congress, where they must be set, and provides the procedures to bring these purposes into the considerations of researchers and administrators when deciding which research to do.

The legislation establishes an appropriately broad set of purposes for agricultural research including enhancing farm and rural employment, strengthening small and moderate sized family farms, enhancing environmental quality and human health and improving the sustainability, productivity, efficiency, competitiveness and resiliency of U.S. agriculture. The procedures proposed by the Act would be particularly effective in directing competitive grants toward these ends.

The Act could be strengthen by creating more effective procedures to direct use of noncompetitive funds toward serving these goals. One means might be to add a second tier of consideration to the established peer review process. Researchers and institutions could be evaluated for the extent to which they aim their research toward these goals. Those who do well, could be provided access to a special pool of funds created to reward excellence.

We do have some concerns about the changes made by the Act in the composition of the Users Advisory Board. I doubt the feasibility of having members elected by constituencies and am concerned about the diminution of farmer influence on the board by S 2259. We would also like to see some representation of sustainable agriculture researchers on the Joint Council. Nonetheless, we enthusiastically support the major thrust of this proposal. It is one of the most important pieces of agricultural research legislation proposed in some time.

Likewise, we support Senator Leahy's proposal to provide a $40 million authorization for the Low Input Sustainable Agriculture Research Program (LISA). The current $4.45 million appropriation is less than one half of one percent of annual federal expenditure on agricultural research. As a member of the North Central Region Technical Committee which evaluates LISA proposals, I can vouch for the inadequacy of this funding level. Even after removing the proposals that did not receive a favorable rating by the Committee, the cost of the remaining proposals was many times the funds available.

Likewise we support Senator Leahy's proposal to beef up extension programming in sustainable agriculture. Most farmers would like to reduce the use of purchased inputs, but lack the information on how to do so without sacrificing productivity. This legislation would make that information more available. We also support Senator Leahy's proposal to redirect federal funds currently spent on developing herbicide tolerant crop varieties. It is simply not the highest and best use for our scarce public research funds. Finally, though not formally introduced, we support the Sustainable Agriculture Initiative, developed under the Leadership of the Consumer Federation of America, with broad environmental, consumer and farm support. The Initiative would redirect federal research funds toward sustainable agriculture.

Thank you for the opportunity to testify.

TESTIMONY

Presented to

The Subcommittee on Agriculture
Research and General Legislation

Senate Committee on Agriculture

On Behalf of

The Experiment Station Committee on Organization and Policy (ESCOP)
of the Division of Agriculture
National Association of State Universities and Land-Grant Colleges

by

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March 27, 1990

Mr. Chairman and members of the subcommittee, I am James M. Davidson, Dean for Research and Director of the Florida Agricultural Experiment Station, Institute of Food and Agricultural Sciences (IFAS), University of Florida. I also currently Chair the Experiment Stations Committee on Organization and Policy (ESCOP) in the Division of Agriculture of the National Association of State Universities and Land-Grant Colleges.

Sections and subtitles contained in Title XIV of the Food Security Act of 1985 are important in terms of guidance and funding for agricultural research, extension and resident instruction programs in Land-Grant Universities. These federal legislative actions, in concert with significant guidance and funding from the state legislative bodies associated with each Land-Grant University, have made this nation's agriculture the envy of the world. This success, however, may not have occurred without some cost to our environment, natural resources, and social structure.

The major challenges confronting agriculture today center on the competitiveness of U. S. agricultural products in world trade, safety and quality of the U. S. food and water supply, export/import trade and tariff policies, viability of the rural economy and the management and sustainability of our natural resources. The urgency to consider any one of these topics may vary from state to state, depending on climate, natural resources threatened, commodities grown or rural structure, but collectively they represent the primary issues of concern to the general public.

Briefly stated, I believe agriculture will be evaluated in the future not solely for its ability to provide food and fiber, but also for its ability to be competitive while remaining compatible with its environment.

If we are to appropriately and successfully address these two issues - competitive position in the world market place and compatibility of production system with environment - we must receive a major increase in funding for agricultural research. At the present time, annual appropriations of federal and state base funds are inadequate for state agricultural research and extension programs to solve both competitive and compatibility issues while at the same time addressing the natural threats which arise unexpectedly each year. For example, Russian wheat aphid and wheat streak mosaic virus in Nebraska, Mediterranean fruit fly in California, barley yellow dwarf virus and powdery mildew in Missouri, grasshoppers in South Dakota and white fly and tomato spotted wild virus in Florida.

The State Agricultural Experiment Stations, along with affiliate groups in forestry, home economics, veterinary medicine, and the 1890 Land-Grant Universities have an active, working strategic planning process that fosters a continual assessment of research priorities. The ESCOP plan is updated annually and a major revision is undertaken every four years. The quadrennial revision involves a concerted two-year effort soliciting and evaluating input from a broad cross-section of groups involved and affected by agricultural research.

The plan and priorities are the result of input received from industry, professional and scientific societies, commodity groups and conservation and consumer groups. This past year more than six hundred separate recommendations were submitted from outside the State Agricultural Experiment Station System for new and continuing research.

The recent process included a major symposium to debate and sharpen the recommendations, and concluded with a major workshop in August, 1989, to draft the quadrennial plan. The ESCOP quadrennial plan and research agenda are organized under the same broad headings that were used by the National Academy of Sciences in its report entitled, "Investing in Research -- A Proposal to Strengthen the Agricultural, Food and Environmental System" (October, 1989).

The agenda for research of the State Agricultural Experiment Stations is titled, "Research Agenda for the 1990s -- A Strategic Plan for the State Agricultural Experiment Stations." It charts the future directions for experiment station research.

In the recent planning process, ESCOP has identified six broad areas of research that are important to our nation's future and need to be enhanced. They address:

1. Environment and Natural Resources: Research to protect water quality and the conservation and efficient use of water; to improve the compatibility of agriculture, natural resources, and the environment; to develop an understanding of the impacts of global environmental change; and to improve the sustainability of natural resource productivity. This last topic encompasses core areas of forestry, rangelands and wildlife resources for recreational and commercial use.

2. Food, Nutrition and Health: Research to ensure the safety and stability of consumer foods; to understand the molecular and cellular basis of human nutrition; and to develop optimal health parameters through improved understanding of nutrition and health.

3. Processing and Value-Added: Research to develop new processing technologies for added values; to expand biomaterials use and derive alternative uses of plant materials; to determine the physio-chemical properties of food and biomaterials; to develop novel food and fiber bioconversions; to quantify sensory and quality attributes of consumer products; to develop analytical methods for monitoring nutrient, toxicant, and bio-active agents in foods; and to develop new and novel packaging systems.

4. Economic and Social Issues: Research on these economic and social issues to enhance rural community and economic performance with a focus on developing the potential of small rural business enterprises; to improve marketing efficiency and competitiveness of agricultural products, both domestically and internationally; to develop a better understanding of the stability and well being of families, youth, and the elderly; to assess the impacts of new technologies on the environment, people and communities; to

develop a better understanding of dietary patterns, health and the behavior of the food consumer; and to develop a research and education policy for agriculture and rural society.

5. Animal Systems: Research to identify mechanisms that control the composition and nutritional quality of animal products; to achieve genetic enhancement of animal efficiency; to improve animal health and well being; to understand the biology of animal production performance; and to develop range and pasture-based animal productions systems.

6. Plant Systems: Research to develop systems for more safe and effective management of pests; to understand the process of genetic enhancement of plants; to develop improved plant production systems; and to improve the understanding of the use of plants to enhance the quality of the environment.

These new initiatives build on the quality of the base programs of the State Agricultural Experiment Stations. In each program area, the current strengths are specified, reallocations of the base programs identified, and new initiatives proposed. For example, in animal systems research, a substantial redirection toward biotechnology has occurred in departments of animal, poultry, and dairy science and in colleges of veterinary medicine to exploit new technologies and develop diagnostic tools, new immunogens, and a better understanding of the genetics of animal health. Active base effort in production-oriented research, especially animal health research, however, must be maintained and new areas of food safety issues such as residues and microbial contamination addressed. Unfortunately, the overall investment in animal systems research has been relatively stagnant, when expressed in constant dollars. A similar statement of redirection and new funding requirements to support the base program can be made for each of the other five research program areas.

To prevent further erosion of the base programs, the State Agricultural Experiment Stations are recommending a six percent increase in funding for FY 1991 in base programs, specifically Hatch Act programs, McIntire-Stennis, Evans-Allen programs, and Animal Health (Section 1433) program support. These base programs provide the core federal support in each state, the leverage nearly six times additional state funds. The State Agricultural Experiment Stations oppose the proposed executive budget's $4.3 million reduction of McIntire-Stennis support for forestry research, and oppose the proposed $5.4 million reduction in animal health (Section 1433). Both program areas provide essential, ongoing base support to solve forestry and animal health problems and help maintain the competitiveness of these industries.

The National Research Initiative, to strengthen the agricultural, food and environmental systems, is a plan for expanding the scientific effort and knowledge base of the six program areas. The expansion of the competitive grants program through the National Research Initiative would complement, not substitute, for enhanced funding of the base programs. Such an expansion, however, must not come at the expense of currently funded programs, particularly at the expense of base funds, for the deterioration in base funds would further reduce the ability of SAES scientists to respond to local and identified needs.

The State Agricultural Experiment Station system fully endorses the National Initiative for Research on agriculture, food, and environment. The Board on Agriculture called for overall $500 million effort. We recommend that $150 million be initiated in FY 1991. The president's FY 1991 budget proposal called for starting the National Initiative at $100 million, of which $42.5 million is current competitive grant funds and $57.5 million is additonal funding. We would also point out that the executive budget does not include two of six program areas and would not adequately support two other areas. This problem can be solved by funding at the level recommended by the Division of Agriculture (NASULGC).

The State Agricultural Experiment Stations also recognize and are responsible for research that must be directed and closely linked to state need. We recommend the continuation and strengthening of special grants (Section 2-C) programs, and Integrated Pest Management, acid precipitation, minor use animal drugs, the pesticide clearance and pesticide impact assessments program, and the Centers Program in Rural Development, Aquaculture, and International Trade. The special grants program in Water Quality and Management and Global Change reflect selected national priority areas. One other program bears mentioning, the Alternative Agriculture or Low-Input Sustainable Agriculture (PL.99.198) effort has brought researchers, extension, and growers together in efforts to achieve a competitive and profitable system of production while reducing expensive inputs; this program deserves continued support.

In addition to the research agenda, ESCOP strongly supports the resident instruction and extension requests to strengthen education programs that affect our ability to conduct research and transfer technology in the future. Without this ability, new knowledge will not be generated and transferred to users who would gain the economic benefits. Specific needs are for the educating of future scientists. Ultimately, the agricultural research and education system and the nation are depended on well-educated people. A well-educated cadre of scientists is the foundation necessary to solve this nation's environmental, production, and economic problems. The National Research Initiative will enable the nation's colleges and universities to make substantial progress toward alleviating the projected shortage of scientists. The 1890 Capacity Building Grants will strengthen these universities and colleges in their efforts to expand minority expertise in food and agriculture.

The State Agricultural Experiment Station system is dedicated to enhancing cooperation and coordination of the USDA/Agricultural Research Service, the principal federal agricultural research agency. Our review of the executive budget indicates that funds are being requested for the construction of additional laboratory space at the National Seed Storage Laboratory, Fort Collins, Colorado. This funding is included in the budget request of the agricultural research service, USDA. The National Seed Storage Laboratory represents a unique facility for American agriculture and an important component in our country's efforts for plant exploration, germplasm preservation, breeding, genome mapping and other genetic studies. ESCOP supports this budget request and hopes that Congress will do likewise.

Mr. Chairman, that concludes my statement. I appreciate the opportunity to present these comments and recommendations for your consideration on behalf of the state agricultural experiment station system.

Statement of David R. Dyer

Subcommittee on Agricultural Research and General Legislation
Committee on Agriculture, Nutrition, and Forestry
United State Senate

March 29, 1990

Mr. Chairman, I am David Dyer, Director of Policy Development for the American Farmland Trust. I am presenting this testimony on behalf of a number of groups that have worked together to generate a set of proposals for inclusion in farm bill legislation. In addition to the American Farmland Trust, these groups include the Center for Resource Economics, the National Audubon Society, the Natural Resources Defense Council, the National Wildlife Federation, the Sierra Club, Public Voice for Food and Health Policy, the Institute for Alternative Agriculture, the Consumer Federation of America, and the Soil and Water Conservation Society.

This testimony speaks to our common goals and recommendations. It does not attempt to answer every question about particular allocations of funds.

Mr. Chairman, I will attempt to make four points concerning research, extension and teaching needs:

First, more funding is needed to construct a solid and technical foundation for wide spread adoption of environmentally sound farming practices that produce safe food and preserve water quality.

Second, more funding should be devoted to integrated systems research that provides a view of farming operations as more than a collection of unrelated parts.

Third, in an era of tight budgets, existing funds should be redirected to high priority national research and extension needs -- specifically, expanding the commitment to Integrated Pest Management programs and particularly those that stress use of biological controls; funding sustainable agricultural research projects under the Agricultural Productivity Act; and expanding the technical assistance capabilities of the Extension Service and Soil Conservation Service.

Fourth, research and extension efforts by themselves will not solve many of the problems facing agriculture and the environment today. Without new policies that directly address these problems, we cannot foresee significant progress in controlling erosion, curbing ground and surface water contamination, and protecting natural resources.

Adequate funding is necessary to building a sound research and extension system for the future

Funding for agricultural research, extension, and teaching systems has not kept pace with the demand for new knowledge that farmers and ranchers have generated. Producers of food and fiber are today confronted with a complex world-wide market that operates according to uncertain and continually changing rules. Failing to keep up with market shifts, environmental concerns, or any of a myriad other day-to-day changes can spell financial disaster for producers. Failing to operate the farm or ranch with an eye to the long term sustainability of the enterprise can be a longer term calamity for both the land owner and the nation.

Unfortunately, not enough is being done to help producers with either the short term or long term concerns.

Many proposals for additional research funding will be discussed here in the authorizing committee and perhaps more vigorously in the Senate Committee on Appropriations. A network of advocates for increased funding has been formed. That network is working through the university advocacy organizations to breathe fiscal life into the recommendations of the Board on Agriculture of the National Research Council [National Academy of Sciences, 1989]. Many conservation, environmental, and consumer groups are also constructing plausible arguments for a major infusion of funding into the nation's agricultural research systems, one being called the Sustainable Agriculture Initiative for the 1990 farm bill.

These proposals have in common a realization that the nation's agricultural productivity is inextricably linked to the environmental consequences of production and have a direct impact on health and food safety. And the linkage is not a gain-and-loss trade-off; for any long term view, "economics" becomes synonymous with "environmental protection".

The nation needs more research effort and more research results to show how we transform our production systems from those that are resource extractive to those which are resource conserving. The nation needs those results soon and the imperative for early progress will call for new funds.

Agricultural research funding made available by Congress should greatly expand the outlays for grants made under the Competitive Grants program and other federally supported research programs on sustainable farming systems, input-efficient farming and integrated pest management. The research delivery systems --the cooperative extension service, the Soil Conservation Service, and the teaching programs -- should be expanded and have their capability upgraded. Delivery systems should be able to provide state-of-the-art information concerning source reduction, natural resource conservation, and sustainable farming.

More systems research is needed

Not enough research and technical assistance is available for farmers and ranchers who wish to modify their production systems for maximum environmental benefits.

Since at least 1985, when the Agricultural Productivity Act was enacted, Congress has recognized the need for systems research. The principal intent of the legislation has been to emphasize the use of on-farm projects with direct practical application for farmers that can document and demonstrate the positive biological, chemical, and physical properties and interactions of sustainable systems. Unfortunately, the Agricultural Productivity Act research program has been a poor stepchild within overall federal research. For the past two fiscal years, the program's budget has been $4.45 million annually -- an amount that represents less than one percent of total USDA research spending. By way of further comparison, direct outlays under the target price deficiency payment system amount to $30 million to $40 million **daily**.

Underfunding is strangling the interest in researching ways to achieve practical farming systems.

Matching program funding could help. Iowa has initiated a model farm program designed to show hundreds of farmers how to achieve more efficient fertilizer and pesticide use through on-farm demonstrations throughout the state. On a more modest scale, the American Farmland Trust has worked with farmers using this same demonstration model in Illinois (1989) and will sponsor such programs this year in Indiana and Missouri, at the request of the cooperative extension systems in those states.

Related to the need for systems research is the need for expanded efforts in the area of Integrated Pest Management (IPM) programs. USDA has operated the IPM program with about $10 million annually for almost 20 years. A larger financial commitment to IPM systems would enable wider adoption of non-chemical pest control methods that could reduce use of certain pesticides.

Producers have a strong interest in addressing pest control in a manner that is both cost effective and environmentally sound. Many have already implemented thoughtful, practical plans for responsible chemical use. But unless these efforts are buttressed by the research budget, unless producers have a reliable source of new information about effective chemical management and use of biological controls, the trend toward a more sustainable agricultural environment will be cut short.

In regard to biological controls, our failure to fund domestic and foreign exploration for and experimentation with biological control of pests has put the United States farther behind than we should be. As the rest of the world becomes more developed and exploited, the search for biocontrol agents will become more difficult. We cannot afford to delay an extensive publicly funded research effort to find and study the biology of potential biocontrol agents; select and improve strains of beneficial agents for further development; and transfer the technology to commercial entities. All IPM programs must emphasize biological control research, and sustained long-term support must be provided to investigator projects.

Further, the success of IPM programs in bringing together many disciplines to work together in a systems approach to problem solving should be replicated and expanded. Other disciplines, notably weed and plant sciences as well as the sciences associated with genetically engineered crops, must be included in future efforts.

IPM should emphasize the total ecology of crop production -- indeed, the entire ecosystem. With this emphasis, funding for IPM activities should stimulate investigation of new production techniques, the role of classical biological controls and cultural practices, and interactions among pests and all farm management activities.

Other related reasons for redirection of research funding exist. Some farmers are interested in producing food products in ways that are considered by some consumers to be more healthy or safer than food products that are marketed under current systems. Redirection of funds available to the Agricultural Research Service or Cooperative State Research Service into alternative agricultural production and marketing practices may provide these farmers with profitable opportunities.

Existing funds should be shifted to high priority programs

The past achievements of and benefits from agricultural research are well known. However, much of the emphasis of past research has been simply increasing production and such exclusive emphasis is not warranted today.

The budget limitation is one unpleasant reality that advocates continually encounter. Whenever we discuss incentive programs, pilot programs, research needs or any of several other proposals, we are reminded continually that no more funds are going to be available and less funding is likely. That unpleasant reminder has been echoed by Members of Congress, Congressional staff, and administration officials alike.

In an era of tight budgets, hard choices have to be made. Among those hard choices are funding reallocations instead of funding increases -- choices instead of blanket increases, and choices instead of across-the-board reductions.

Nearly $ 1 billion of federal research funding is available to the Agricultural Research Service and through programs administered by the Cooperative State Research Service. Another $ 250 million is disseminated through the Cooperative Extension budgets. Within the scope of the funding that is routinely available, it is almost unbelievable that the public interest in sustainable farming systems has been so completely ignored.

More than research is needed

Research and dissemination of useful research results are necessary components of a successful agricultural production and marketing system in the future. But research is not enough.

To achieve meaningful progress in protecting both agricultural profitability and the environment, more direct steps must be taken to modify farming practices. These steps include strengthened enforcement of existing environmental laws, better record keeping, and a reform of commodity program provisions. The marketing and distribution of farm products can be improved by stressing nutritional value rather than appearance, certifying and correctly labeling organically produced food, and allowing the market signals about such foods to flow back through the marketing system to growers. And long term protection of the natural resource base of the United States should be the foundation upon which we build our progress.

Mr. Chairman, thank you for the opportunity to express our views. We look forward to working with you and members of the subcommittee as you develop components of the new farm bill.

Testimony of
Donald L. Uchtmann,
Director,
University of Illinois Cooperative Extension Service
and
Associate Dean
University of Illinois College of Agriculture

before the
Agricultural Research and General Legislative Subcommittee

of the
Committee on Agriculture

of the
U.S. Senate

Washington, D.C.
March 29, 1990

Mr. Chairman, thank you and your colleagues for the opportunity to speak regarding the Science and Education Title of the 1990 Farm Bill. I am Donald Uchtmann, Director of the University of Illinois Cooperative Extension Service, and Associate Dean of the University's College of Agriculture. I have been assisted in the preparation of this written testimony by Peter Bloome, Assistant Director and Program Leader at Illinois.

The University of Illinois Cooperative Extension Service is part of the Cooperative Extension System, a partnership which links the Extension Service (ES)-USDA, the state land grant universities, and local governments. A key element in this visionary partnership was the linkage of the knowledge and research capacity of the land-grant universities to the needs of the public. The linkage is a two-way street involving both a) the transmittal of research-based knowledge and information from universities to the people (and the important interactive teaching by advisers and specialists that accompanies that transmittal) and b) communication from the people to the universities regarding needs for knowledge and applied or adaptive research. The products of this unique partnership are timely, outstanding educational programs of practical value to the citizens of our nation. As examples, we have attached a description of some recent Illinois programs.

The Cooperative Extension System has a proud history dating back to its creation in 1914. Our tradition of success is one of the enduring strengths that is so important to our successful transition into the decade of the 90s and the next century.

If what is happening at Illinois is any measure of what is happening system-wide, then the Cooperative Extension System is in the midst of an exciting transition that will be of immense value to the agricultural industry, rural America, and all citizens who depend on a safe and wholesome food supply, who are demanding responsible stewardship of our natural resources, who recognize that a food and fiber production system is only sustainable if it is kind to the environment and economically feasible, and who live in rural and urban areas and can benefit from a broad range of evolving extension programs addressing, for example, youth development and family wellbeing. Let's note some of the things that are happening at Illinois.

Programming is being driven more and more by important issues and less and less by historic program offerings. Illinois has identified seven priority issues that are driving the development of new educational programs: 1) Agriculture Competitiveness, 2) Environmental Quality and Soil Conservation, 3) Youth Development, 4) Family Wellbeing, 5) Rural Revitalization and Community Development, 6) Food Safety and Nutrition, and 7) Leadership Development. These state identified priorities are very similar to the national priorities adopted by the national Extension Committee on Organization and Policy.

Cooperation and interaction between extension and research is increasing. This phenomena is apparent throughout the organization. The Directors of Extension and of the Agricultural Experiment Station now meet routinely every week to discuss common problems and opportunities. An extension specialist was recently reassigned to become the Program Leader for Environmental Issues for both extension and research. An outstanding extension person who had served as an extension Assistant Director was named to lead our extension and research initiatives in sustainable agriculture. An increasing number of specialists are carrying joint extension and research appointments. Extension Advisers (agents as they are known in other states) are meeting more frequently with research faculty. Academic staff working at outlying research farms are shifting from exclusively research appointments to combination research and extension appointments.

Plans have been developed to tap a broader segment of the University of Illinois research and teaching base in support of extension and research programs. An extension revitalization plan has been discussed among and is supported by the Director of CES, the Director of the Agricultural Experiment Station, the Dean of the College of Agriculture, and the President of the University of Illinois. The plan calls for a) significant new investments in extension and the experiment station by the state and counties of Illinois, b) the allocation of funds for extension and research programs outside the College of Agriculture where needed capabilities to support our research and education missions exist; and c) significant revitalization of extension and research within the College of Agriculture. The first installment of new state funds to support this effort were included in Governor Thompson's proposed FY91 state budget and new county funds will be provided starting in FY91.

Extension is in the midst of a process to rebuild itself to meet the needs of Illinois citizens in the next century. In August of 1989, Illinois extension began a process to rebuild itself to meet the needs of the future. The process CES-2000: Building for the Next Century was born out of a recognition that the world was changing very rapidly and CES needed to change as well if it was to be a leader of adaptability and change, rather than a follower. The rebuilding process is being driven by the new concept of issues programming, new insights regarding the respective roles of the CES partners, budget lessons of the 1980s, and a renewed appreciation for flexibility. The operative guidelines for this process are as follows:

1. As we create a blueprint for CES2000, our mindset should be that of a builder. We should think of how exciting it must have been in 1914 when the idea of CES came to fruition and our wise predecessors started to build an organization for that time. If they were being asked to build a CES for the year 2000, wouldn't they be even more excited? They could draw on the many lessons of the past 75 years, and have far more resources than they had in 1914.

2. CES 2000 must be sufficiently flexible to excel in program delivery under any of the probable funding scenarios for the future. For CES 2000, the difference between a bright and less bright funding scenario should be only a difference in the scale of our excellent programs. CES 2000 must also be sufficiently flexible to exploit technology developments that cannot be predicted with precision.

3. CES 2000 must have pay scales that will attract and retain high caliber people that can make the University of Illinois Cooperative Extension Service as progressive and effective a state organization as can be found anywhere in the entire Cooperative Extension System.

4. In CES 2000 the workload must be commensurate with the number of CES staff; the nature of work carried out by this staff must be commensurate with its professional skills.

5. CES 2000 must have the capacity to expand rapidly, in a non-permanent mode to capture various funding opportunities associated with changing national and state issues; segments that have expanded rapidly must also have the capacity to contract with reasonable speed as priorities change.

6. CES 2000 must continue to exploit our enduring strengths; for example, ties to the Land-Grant University research base, involvement of local citizens in program development and needs assessment, effective use of thousands of volunteers, effective partnerships with other agencies and groups. Although these strengths have been with CES since 1914, the ways in which they are exploited may be different in the year 2000.

7. CES 2000 must have the capacity to deliver quality programs in both urban and rural environments. Many issues of the next century will cut across both rural and urban audiences.

8. CES 2000 will rely primarily on recurring state and local dollars to fund its core staff.

Extension is examining alternative ways to reconfigure our campus and local presence throughout the states. As a part of the CES 2000 process, our front line people (extension advisers and specialists) are exploring alternatives to our current configuration of advisers and specialists. Driving this re-examination is a recognition that the knowledge base supporting extension programs is increasingly complex and the ability of a single adviser to master and maintain currency in all essential dimensions of that knowledge base is increasingly difficult, if not impossible. We need to find ways to provide farmers, local government officials, and other clientele with access to a team of advisers and specialists who collectively can provide far more relevant information than is now available through our system. Also driving this re-examination is a recognition that the number of extension advisers and specialists in Illinois has decreased approximately 20 percent in the past decade; and that whatever number of advisers we have in the future must be supported better than ever before; that developments in communications and educational technology will continue and will offer new program delivery possibilities unimagined in the past; and that increased cooperation across county lines, across departmental lines within the university, and across state lines of the Cooperative Extension System, are essential if our programs are to be timely, relevant, high quality, and cost efficient. We do not yet know what the outcome of the rebuilding process will be, for the process is still unfolding. But we are committed to being the best that we can possibly be in the increasingly competitive, fast paced, complex world of today and tomorrow.

Having sketched some changes taking place in Illinois, let me suggest that similar changes are or will be taking place throughout the system. California, for example, has probably gone as far or farther than any other state in integrating extension and research. Nebraska has worked hard at increasing the specialized skills of advisers through "clustering;" it has also conducted follow-up studies of clustering--studies that have been very helpful to me. Missouri, like Illinois, is developing a plan that will alter the local presence of extension and probably the responsibilities of the partners to support that local presence. South Dakota has recently succeeded in increasing state support for extension. And the entire system is rapidly responding to the challenges of issues-based programming.

In closing, I offer the following observations about the Cooperative Extension System--observations that may be helpful as the Science and Education Title of the 1990 Farm Bill is developed.

1. The Cooperative Extension System is a partnership, not a typical agency of the U. S. Department of Agriculture. The role of the federal partner in financing that system has declined relative to the state and local partners during the last decade. Federal law should not treat the other partners as if they are subordinate to the federal partner.

2. The System continues to change rapidly, and there are many differences from state to state. The operation of CES in any one state does not necessarily reflect the operation of CES in another state.

3. One of the reasons that extension is so successful in educational programs is that it is perceived as unbiased. Truth, as discovered by a scientific process, is the content of our programs. If extension is ever forced to be an advocate for a position determined politically rather than scientifically, the great strength of the system will be destroyed.

4. Competition in a global economy demands an excellent basic research base, coupled with an applied and adaptive research program closely linked to the end-user. The speed with which scientific breakthroughs can be brought "on line" in a production process depends on establishing the shortest and fastest two-way links between applied and adaptive research and the end-user. Federal law should streamline these links as much as possible.

5. The Cooperative Extension System needs to be recognized in farm bill authorizations involving the critical issues now being addressed. CES needs a designated role and funding support from its federal partner to carry out effective educational programs. Now is the time to reverse the trend of decreasing purchasing power of federal investments in the Cooperative Extension System.

Thank you. I will be happy to respond to questions.

PROGRAM EXAMPLES

Peter D. Bloome
Assistant Director and Program Leader
Illinois Cooperative Extension Service

Integrated Pest Management

Integrated Pest Management is a tremerdous success story which traces its beginnings to 1962 and Rachel Carson's "Silent Spring." Historic pest management tactics such as multiple crop rotations, early harvesting, strip cropping, mechanical cultivation, trap cropping and manipulation of planting dates are now supported by pest scouting, economic thresholds, economic injury or "action" levels, sampling techniques and definitions of general equilibrium positions of pest populations.

Pest management now involves detailed information concerning the biology of the pest's life system and use of that knowledge to deny the pest the biological capacity to become an economically significant problem. The use of pesticides, while continuing to play a role in IPM, must be thought of as a last and temporary strategy to minimize crop losses. Pest management practices that lower the general equilibrium position of pest populations will be emphasized in the 1990's and beyond. These will include the use of host plant resistance, crop rotation, changing tillage practices, variation of planting or harvest dates, proper fertilization, proper sanitation, use of trap crops and biological control.

Concerns over ground and surface water contamination are increasing, along with interests in alternative and sustainable agriculture systems. IPM specialists in Extension and research are increasingly looked to by agriculturalist and the public for answers to complex problems.

Scientific response to "Silent Spring" has resulted in the development of biologically based integrated approaches to pest management capable of responding to current environmental and health concerns while maintaining the necessary productivity of our food system. Yet somehow, the power of that message has not been effectively conveyed.

In Illinois, the IPM Extension effort is supported by $232,000 of earmarked federal funds, down from $244,000 in 1983. We, of course, annually allocate federal formula and state funds to support our vital IPM program. While water quality has become a national concern, while pesticide residues on food command national attention, and while the call has gone out for alternative farming systems more in tune with agricultural sustainability, the purchasing power of IPM earmarked funds and federal formula funds to ICES has fallen by more than 1/3.

The IPM program in Illinois has been effective. For example, corn rotation with other crops, usually soybeans, is the most effective and proven tactic for managing corn rootworm populations. In 1985, 34% of the Illinois corn crop was produced on land planted to corn the previous year. That value fell to 26% in 1988. For corn following other crops, only 14% of these acres were treated with a soil insecticide at planting. Considering the Illinois corn crop as a whole, the acreage treated with insecticides of all kinds fell from 44% in 1985 to 37% in 1988 in spite of fierce soil insecticide advertizing campaigns. In Illinois, herbicide use on corn and soybeans peaked at 65.3 million pounds of active ingredients in 1982. In 1988, the total had fallen to 45.4 million pounds of active ingredients. While this 30% reduction is impressive, it is due in large part to the use of newer herbicides which are used at lower applications rates.

The Drought of 1988

During the summer of 1988, a drought with magnitude rivaling that of the 1930's settled on the midwest. A College of Agriculture Task Force on Drought met weekly to assess the situation, plan strategies and assemble and disseminate information. A weekly TeleNet with county staff provided two-way communication with all Extension offices in Illinois. All field offices were provided twice weekly packets of background information and news releases.

Two series of Drought Updates were staged at three locations involving ten specialists in Agronomy, Entomology, Plant Pathology, Agricultural Engineering, Agricultural Economics, Animal Sciences and Veterinary Medicine. During the first week of July the alarm was sounded concerning corn pollination. Losses were estimated at $200 million per day for that week.

During the second series of updates held the last week of July, statewide losses were estimated at 50% for corn and 25% for soybeans. This projection held up as November 1 projected yields were 70 bu/ac for corn and 27 bu/ac for soybeans.

ICES was first to call attention to the drought, first to accurately predict crop yields, and first to project the impact of the drought on the Illinois economy. ICES was THE authoritative source of drought information in the state during the difficult summer of 1988.

A Drought Update Tabloid was produced and 115,000 copies distributed through Extension offices and agricultural events. It was designed and timed to anticipate harvest, grain quality, marketing and livestock feeding issues arising from the drought.

These efforts had a profound impact on the profitability of Illinois agriculture during 1988. Profits were enhanced by avoiding mis-diagnosis of problems (frost damage), correct and effective use of economically indicated pest management (spider mites, bean leaf beetles), reduced use of pre-emerge and at-plant herbicides, better informed marketing decisions, avoiding livestock losses and the need to sell livestock for lack of feed, and improved rations for livestock. Conservatively, the benefits of reduced costs and increased profits far exceeded the total local, state and federal investment in Illinois CES in 1988.

RURAL ROUTE

On March 1, 1985 the Illinois Cooperative Extension Service began RURAL ROUTE in response to the farm financial crisis. A telephone hotline provided anonymous contact for members of financially stressed farm families. Extension staff served as counselors (helpers) for these families, working to provide for four needs:

1. The need for the family to understand the financial realities of their farm business.

2. The need to make family decisions consistent with the values and goals of individual family members.

3. The need to be pro-active in carrying out decisions and in working toward a resolution of difficulties.

4. The need for emotional support from family, friends, neighbors, church and community.

Almost 3,500 calls were received during the more than four years of hotline operation. These calls, plus direct Extension office contacts, resulted in face-to-face work with more than 4,000 Illinois farm families involving more than 8,000 sessions. In addition, workshops on farm financial analysis, family resource management, family communication, stress management, career planning and job search skills reached 30,000 individuals. A companion program titled, "Your Financial Condition," involved 200 volunteer teachers working with Extension staff in teaching farm financial analysis to 7,000 farm families.

RURAL ROUTE concentrated on saving people and families rather than on saving farms. We helped farm families make difficult decisions while avoiding the temptation to make those decisions for them. RURAL ROUTE received the USDA Superior Service Award in 1986.

On June 30, 1989, we celebrated the end of this program that had so many important dimensions: saving lives, families and farms; teaching the skills of financial analysis, stress and conflict management, communication and family decision-making; and enlarging our own sense of responsibility to those whom we are privileged to teach and serve.

During the life of the project we received $275,000 of federal special project funds and $2 million in state support. In addition, we reallocated a minimum of $5 million of state and federal resources annually to the project.

As a State Program Leader, I feel compelled to report that during the 4 1/3 years of this project, the purchasing power of the federal formula fund allocation to the ICES fell by more than 20%. Our capacity to mount such a rapid response, targeted effort is greatly diminished since 1985. In fact, the purchasing power of the federal portion of the ICES budget is one-half of what it was just one decade ago.

Cabrini-Green

Let me now shift the focus to Chicago. Eight thousand people live in Cabrini-Green, an area three blocks long and five blocks wide. Three out of four residents are 21 years of age or younger. Four out of five live in families with a single parent. All are minorities. Sixty-five percent are unemployed. The average income is $5,000 per year. Graduating eight graders are reading two and a half years below the national average. Many do not finish high school.

After discussions with the Chicago Department of Human Services and other agencies, two 4-H clubs were formed to provide Cabrini-Green youngsters with access to low cost 4-H resource materials, experiential learning opportunities, and the recognition/incentive program.

The club meeting site was established as a neutral area for gangs and no "signing" or "colors" are allowed. Current combined club enrollment is 190 youngsters and 35 volunteers. Major individual projects include citizenship, nutrition, reading, home environment, and clothing. Club activities center on improving personal behavior through group meetings, demonstrations, and value identification through testimonies and on environmental awareness and cleanups.

The clubs have submitted financial proposals for group activities to be carried out in the housing project. One club received funding for a Community Health Project from the Illinois 4-H Foundation. The other worked with monies designated for community beautification and cleanup.

At recent end-of-the-year meetings, over 50% of the youngsters were recognized for completing goals set at the beginning of the year and agreed upon by the leaders. Members received items which rewarded their participation, progress toward goals, and achievement of pre-set standards of behavior. Agency personnel report that youngsters involved in the 4-H program were less involved in gang activities.

We believe 4-H has a place in the Chicago Housing Authority project buildings. The role modeling, group experience, experiential and activity oriented emphasis all have positive effects and provide alternatives to gang activities.

PDB
3/26/90

TESTIMONY BEFORE THE

SENATE AGRICULTURE COMMITTEE'S

AGRICULTURAL RESEARCH AND GENERAL LEGISLATION SUBCOMMITTEE

MARCH 29, 1990

MR. CHAIRMAN, MEMBERS OF THE COMMITTEE. MY NAME IS FREDERICK KIRSCHENMANN. I MANGE A 3100 ACRE FAMILY FARM PARTNERSHIP NEAR WINDSOR, NORTH DAKOTA. IN 1977, WE SWITCHED MANAGEMENT PRACTICES ON OUR FARM FROM ONE WHICH RELIED HEAVILY ON CHEMICAL INPUTS TO ONE THAT UTILIZED ALTERNATIVE APPROACHES. SINCE 1979, WE HAVE PRODUCED ALL OF OUR CROPS AND LIVESTOCK ORGANICALLY. SINCE 1980, WE HAVE MARKETED ALL OF OUR CROPS THROUGH THE MERCANTILE FOOD COMPANY IN GEORGETOWN, CT. NINETY PERCENT OF OUR CROPS ARE NOW EXPORTED TO EUROPE.

BECAUSE I AM INTERESTED IN SUPPORTING THE GROWING NUMBER OF FARMERS WHO ARE SEEKING TO ADOPT ALTERNATIVE AGRICULTURE PRACTICES ON THEIR OWN FARMS, I ALSO SERVE ON A NUMBER OF BOARDS AND PARTICIPATE IN MANY SUSTAINABLE AGRICULTURE EVENTS THROUGHOUT THE NATION.

MANY OF THESE ACTIVITIES ARE RESEARCH RELATED, INCLUDING MY WORK WITH THE NORTHERN PLAINS SUSTAINABLE AGRICULTURE SOCIETY, (A FARMER-TO-FARMER NETWORK THAT HAS BEEN GATHERING AND SHARING INFORMATION ON ALTERNATIVE FARMING PRACTICES SINCE 1979). THE SOCIETY HAS A MEMBERSHIP OF OVER 200 FARMERS FROM NORTH AND SOUTH DAKOTA, AND SURROUNDING STATES AND PROVINCES. MORE RECENTLY, I HAVE BEEN SERVING ON THE BOARD OF THE MICHAEL FIELDS AGRICULTURAL INSTITUTE IN EAST TROY, WISCONSIN, (A PRIVATE RESEARCH INSTITUTE THAT IS DOING ON-

FARM RESEARCH IN SUSTAINABLE PRACTICES WHICH INCLUDES FARMERS IN THE RESEARCH DESIGN.) IN MY ROLE AS COORDINATOR OF THE NORTHERN PLAINS SUSTAINABLE AGRICULTURE SOCIETY'S TASK FORCE ON FOUNDATION AND UNIVERSITY RELATIONS, I ALSO WORK CLOSELY WITH LAND GRANT UNIVERSITIES, SUCH AS THE CARRINGTON RESEARCH EXTENSION CENTER IN NORTH DAKOTA AND THE AGRICULTURAL ECONOMICS DEPARTMENT AT SOUTH DAKOTA STATE UNIVERSITY. I ALSO SERVE ON THE NORTH CENTRAL LISA ADMINISTRATIVE COUNCIL.

THESE INVOLVEMENTS HAVE GIVEN ME A UNIQUE OPPORTUNITY TO OBSERVE THE IMPACT OF THE CURRENT FEDERAL RESEARCH AGENDA ON BOTH RESEARCHERS AND FARMERS, AND TO ASSESS SOME OF OUR RESEARCH NEEDS. BASED ON THAT EXPERIENCE, I CAN SAY UNEQUIVOCALLY THAT THE DIRECTION AND MISSION ENVISIONED BY LEGISLATION SUCH AS THE AGRICULTURAL RESEARCH AND EXTENSION PLANNING, PRIORITY SETTING AND TECHNOLOGY ASSESSMENT ACT OF 1990, AND THE SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION ACT OF 1990, ARE EXACTLY WHAT IS NEEDED.

AS WE ALL KNOW, FOR THE LAST 40 YEARS, THE LION'S SHARE OF AGRICULTURAL RESEARCH HAS BEEN DIRECTED TOWARD HIGH-INPUT, CAPITOL INTENSIVE SYSTEMS OF AGRICULTURE. WHILE THIS RESEARCH HAS PRODUCED MANY BENEFITS TO OUR SOCIETY, WE ARE NOW DISCOVERING THAT THERE IS A DEFINITE DOWNSIDE, ESPECIALLY FOR AMERICAN FARMERS. THE AGRICULTURAL SYSTEM PRODUCED IN THE WAKE OF THE PAST RESEARCH AGENDA HAS PUSHED FARMERS OFF THE LAND IN UNPRECEDENTED NUMBERS AND HAS LED TO THE DISAPPEARANCE OF RURAL COMMUNITIES. THIS EROSION IS FAR FROM OVER. JUST IN THE PAST FOUR WEEKS MY COMMUNITY HAS SEEN THE EMERGENCE OF A WHOLE NEW ROUND OF FARM AUCTION SALES AS FARMERS ARE FINDING THAT THEY CANNOT OBTAIN THE NECESSARY CREDIT TO PLANT ANOTHER CROP THIS SPRING.

IN THE MEANTIME, NUMEROUS FARMERS ARE FINDING THAT THERE IS ANOTHER WAY. THE ALTERNATIVE APPROACHES OUTLINED SO ELOQUENTLY IN THE

NATIONAL RESEARCH COUNCIL'S ALTERNATIVE AGRICULTURE STUDY ARE EXACTLY WHAT MANY FARMERS WANT TO ADOPT. BUT THERE ARE BARRIERS STANDING IN THE WAY, AND ON E OF THE PRINCIPLE BARRIERS IS LACK OF INFORMATION.

A RECENT IOWA STATE UNIVERSITY POLL INDICATED THAT 76% OF THE FARMERS IN THAT STATE BELIEVED THAT MODERN AGRICULTURE RELIED TOO HEAVILY ON CHEMICALS AND 56% INDICATED THEY WOULD ADOPT LOW-INPUT METHODS IF MORE INFORMATION WERE AVAILABLE. THE RECENTLY RELEASED GENERAL ACCOUNTING OFFICE REPORT ON "ALTERNATIVE AGRICULTURE" REVEALED THAT FARMERS FEEL THAT THE KEY BARRIERS TO THE USE OF ALTERNATIVE AGRICULTURE ARE THEIR CONCERNS ABOUT SUCH THINGS A GREATER MANAGEMENT REQUIREMENTS, YIELD REDUCTIONS, INCREASE IN WEEDS AND DECLINING PROFITS. THE STUDY CONCLUDES THAT "UNLESS RESEARCH AND ON-FARM DEMONSTRATION CONVINCE FARMERS THAT THESE ARE NOT PROBLEMS, MOVEMENT TOWARD ALTERNATIVE AGRICULTURE WILL BE SLOW."

THE TINY, FLEDGLING LISA PROJECT, (COMPRISING LESS THAN HALF OF 1% OF USDA'S RESEARCH BUDGET), HAS ALREADY DEMONSTRATED THAT RESEARCH CAN UNCOVER EFFECTIVE, PROFITABLE ALTERNATIVE MANAGEMENT PRACTICES. THE RESEARCH CONDUCTED AT SOUTH DAKOTA STATE UNIVERSITY WITH THE HELP OF LISA FUNDING HAS DEMONSTRATED THAT PROPERLY MANAGED, LOW-INPUT FARMING SYSTEMS ARE IN MANY INSTANCES MORE PROFITABLE THAN CONVENTIONAL SYSTEMS.

AT THE CARRINGTON RESEARCH EXTENSION CENTER IN NORTH DAKOTA, RESEARCHERS HAVE ALREADY FOUND THAT USING CROP RESIDUES TO FEED LIVESTOCK CAN REDUCE FEEDING COSTS WITHOUT SACRIFICING ANIMAL PERFORMANCE. IT IS A STRATEGY GRAIN FARMERS CAN USE TO ADD A PROFITABLE ENTERPRISE THAT MAKES USE OF OTHERWISE WASTED RESOURCES AND GIVES THEM A BETTER REASON FOR KEEPING HIGHLY ERODIBLE LAND IN SOIL-CONSERVING FORAGE CROPS.

RESEARCH OF THIS KIND, THAT MAKES IT MORE PROFITABLE TO PUT LIVESTOCK BACK ON THE LAND IN INTEGRATED FARMS, CAN GO A LONG WAY TOWARD ELIMINATING LIVESTOCK RELATED POLLUTION OF THE ENVIRONMENT. ADDITIONAL RESEARCH ON SUCH PROJECTS HAS PROVEN TO BE POPULAR IN THE LISA PROPOSALS I HAVE SEEN.

IN ANOTHER LISA FUNDED PROJECT, FARMERS AND RESEARCHERS ARE WORKING TOGETHER IN THE CARRINGTON CENTER TO FIND A LEGUME THAT CAN PROVIDE A SOIL-PROTECTING COVER ON FALLOW GROUND THAT WILL NOT TAKE A LOT OF MOISTURE, THAT WILL HELP CONTROL WEEDS AND REDUCE THE NEED FOR NITROGEN FERTILIZER FOR THE NEXT GRAIN CROP. IRONICALLY, RESEARCH CONDUCTED ON THE DEVELOPMENT OF A NEW VARIETY OF SWEET CLOVER THAT MIGHT WELL HAVE PROVEN TO BE JUST SUCH A LEGUME, WAS DISCONTINUED IN 1971 BECAUSE USDA CUT FUNDING FOR THE PROJECT.

IN YET ANOTHER LISA FUNDED PROJECT AT NDSU, WE ARE LOOKING AT THE SOCIAL, ECONOMIC AND DEMOGRAPHIC IMPACTS OF SUSTAINABLE PRACTICES ON RURAL COMMUNITIES. THE RESULTS OF THAT RESEARCH WILL BE VALUABLE INFORMATION, NOT ONLY FOR FARMERS, BUT FOR COMMUNITY PLANNERS AND POLICY MAKERS AS WELL.

QUITE APART FROM THE DATA THAT THIS RESEARCH IS PROVIDING, THERE IS ANOTHER INVALUABLE CONTRIBUTION THAT THE LISA PROJECT IS MAKING TO AMERICAN AGRICULTURE. THE DESIGN OF THE PROGRAM BRINGS FARMERS, RESEARCHERS AND EXTENSION PERSONNEL TOGETHER AS TEAMS TO CREATE AND IMPLEMENT THE RESEARCH. THIS ENABLES FARMERS TO LEARN FROM RESEARCHERS, WHILE RESEARCHERS ARE LEARNING FROM THE EXPERIENCE OF FARMERS. WE NOW SEE FARMERS AND RESEARCHERS WORKING TOGETHER WHO HAVE NOT TALKED TO ONE ANOTHER IN 25 YEARS. THE RESULTS ARE EXPLOSIVE AND WILL PROVIDE POSITIVE BENEFITS TO AGRICULTURE FOR DECADES TO COME.

YET, IMPORTANT AS THESE CONTRIBUTION ARE, THE GREATEST NEED FOR THIS KIND OF RESEARCH LIES IN THE FACT THAT IT IS THE ONLY WAY TO CHANGE

AGRICULTURE. AGRICULTURE CANNOT BE CHANGED THROUGH REGULATION IN THE SAME WAY AS OTHER INDUSTRIES. A FARM IS NOT A FACTORY. CHANGES IN FARMING INPUTS CANNOT BE MADE ARBITRARILY OR PRECIPITOUSLY. A FARM IS AN ORGANISM, WITH AN INTRICATE SYSTEM OF INTERRELATIONSHIPS AND COMPLEX BIOLOGICAL INTERCONNECTIONS. CHANGES HAVE TO BE INTRODUCED INTO THIS COMPLEX SYSTEM SLOWLY AND METHODICALLY, AND WITH A FULL UNDERSTANDING OF HOW A CHANGE IN ONE PART OF THE SYSTEM WILL EFFECT AND INTERACT WITH ANOTHER PART OF THE SYSTEM. SUCH KNOWLEDGE CAN ONLY COME OUT OF RESEARCH AND EXPERIENCE, AND FARMERS CAN NOT BE EXPECTED TO INTRODUCE SUCH CHANGES WITHOUT DEMONSTRATED EVIDENCE THAT THE CHANGES WORK.

MUCH AS I WOULD LIKE TO BE ABLE TO TELL MY FRIENDS IN THE FOOD SAFETY AND ENVIRONMENTAL ORGANIZATIONS THAT WE CAN SOLVE ALL OF THE FARM, FOOD AND ENVIRONMENTAL PROBLEMS THROUGH HEAVY HANDED GOVERNMENT REGULATIONS, DESIGNED TO CHANGE FARMING PRACTICES, IT CAN NOT BE DONE. ORGANISMS LIKE FARMS TAKE TIME TO CHANGE, AND THEY HAVE TO BE CHANGED CAREFULLY AND WITH FULL INFORMATION REGARDING THE IMPACTS OF THE CHANGES.

FARMERS ARE CURRENTLY SKATING ON VERY THIN ECONOMIC ICE. ANY CHANGE IMPOSED ON THEIR FARMING PRACTICES THAT WOULD CAUSE A FURTHER EROSION OF THEIR INCOME WOULD CAUSE YET ANOTHER WAVE OF FARM FORECLOSURES. THAT WOULD BENEFIT NO ONE, LEAST OF ALL THOSE CONCERNED ABOUT FOOD SECURITY AND ENVIRONMENTAL PROTECTION.

INFORMATION IS ONE OF THE KEYS TO MEETING THE DEMANDS OF FARMERS AND CONSUMERS ALIKE. WE BOTH WANT THE SAME CHANGES--SAFER FOOD, A CLEANER ENVIRONMENT, A FERTILE SOIL, A MORE STABLE ECONOMY. REDIRECTING THE AGENDA OF AGRICULTURAL RESEARCH IS ONE OF THE MOST EFFECTIVE WAYS OF DOING THAT.

FARMERS AND RESEARCHERS ARE READY TO RESPOND. ON JUNE 3RD AND 4TH, I WILL BE SITTING AROUND A TABLE WITH 15 OTHER FARMERS, UNIVERSITY

RESEARCHERS AND COMMUNITY LEADERS TO SELECT THE PROPOSALS TO BE FUNDED UNDER THE CURRENT ROUND OF LISA COMPETITIVE GRANTS. WE HAVE ALREADY SELECTED 47 OUT OF 206 PRE-PROPOSALS THAT WERE SUBMITTED IN JANUARY. WE ARE ALL AGREED THAT EVERY ONE OF THE 47 PROPOSALS DESERVE TO BE FUNDED. EACH OF THE PROPOSALS COULD MAKE A MAJOR CONTRIBUTION TO ACHIEVING THE GOALS OF A CLEANER ENVIRONMENT, MORE PROFITABLE FARMING AND SAFER FOOD. UNFORTUNATELY, IT WOULD TAKE $6.8 MILLION TO FUND THEM ALL AND WE ONLY HAVE $875,000. ALLOCATED TO OUR REGION FOR THIS ROUND OF LISA FUNDING. THAT MEANS WE WILL PROBABLY ONLY BE ABLE TO FUND ABOUT SIX OR SEVEN OF THE 47 PROJECTS. DECIDING WHICH ONES TO FUND WILL BE THE HARDEST DECISION IN WHICH I HAVE EVER PARTICIPATED.

AN ADDED DIFFICULTY IMPOSED BY THE SEVERE RESTRICTION OF FUNDING FOR THIS EFFORT LIES IN THE FACT THAT THIS KIND OF RESEARCH NEEDS TO BE MULTI-DISCIPLINARY AND GENERALLY REQUIRES SEVERAL YEARS TO COMPLETE. THE SYSTEMS WE ARE RESEARCHING ARE INTERRELATED AND CAN ONLY BE FULLY SCRUTINIZED OVER AN EXTENDED PERIOD OF TIME. THIS INEVITABLY MEANS MULTI-YEAR FUNDING THAT BRINGS A BROAD SPECTRUM OF PROFESSIONALS, INCLUDING FARMERS, INTO THE RESEARCH PROJECT. COMMITTING SUFFICIENT FUNDS TO SUPPORT SUCH MULTI-DISCIPLINARY, MULTI-YEAR EFFORTS, FURTHER LIMITS THE NUMBER OF PROPOSALS THAT CAN BE FUNDED IN ANY ONE YEAR, OWING TO THE SMALL AMOUNT OF MONEY AVAILABLE.

GIVEN THE POSITIVE RESULTS OF THE RESEARCH CONDUCTED UNDER LISA TO DATE; GIVEN THE NEED TO GET INFORMATION ON THESE SYSTEMS OUT TO FARMERS; GIVEN THE COMMON DESIRE TO ACHIEVE THE COMMON GOALS THAT THIS KIND OF RESEARCH CAN ATTAIN; AND GIVEN THE DEMONSTRATED DESIRE ON THE PART OF THE RESEARCH COMMUNITY TO DO THIS KIND OF RESEARCH, IT JUST MAKES GOOD COMMON SENSE TO SHIFT A SIGNIFICANT PORTION OF OUR AGRICULTURAL RESEARCH DOLLARS TO THIS IMPORTANT WORK.

I DEEPLY APPRECIATE THE OPPORTUNITY TO BRING THESE CONCERNS TO YOUR ATTENTION.

CARET

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TESTIMONY

PRESENTED TO

THE SUBCOMMITTEE ON AGRICULTURAL RESEARCH
AND GENERAL LEGISLATION

OF THE

COMMITTEE ON AGRICULTURE
U.S. SENATE

ON BEHALF OF THE

COUNCIL FOR AGRICULTURAL RESEARCH, EXTENSION AND TEACHING

BY

MARY GRIM, CHAIR

MARCH 29, 1990

A voluntary citizens' organization cooperating with the National Association of State Universities and Land Grant Colleges • Division of Agriculture

Mr. Chairman, let me take this opportunity to thank you and your colleagues of this Subcommittee for holding this hearing on Title XIV of the 1990 Food Security Act. My name is Mary Grim and I reside in Adams County, Pennsylvania. I currently serve as the chair of the Council for Agricultural Research, Extension, and Teaching -- better known as CARET.

CARET is a national grassroots organization of volunteer leaders who are concerned with the agricultural research and education programs conducted by the land-grant system. As volunteers, we work closely with each land-grant school under the umbrella organization of the National Association of State Universities and Land-Grant Colleges (NASULGC). CARET delegates reflect the full spectrum of the agricultural community -- agriculture as defined in its broadest of senses. We are producers, consumers, homemakers, agribusiness leaders, farm groups, commodity organizations and local officials. CARET serves as support of, advisor to and friendly critic of the land-grant system.

I come here today to request that the agricultural research and education programs of our land-grant system continue to be a top priority with Congress in the 1990 Food Security Act. The colleges of agriculture of the land-grant system provide an excellent resource for the important and ongoing task of responding to the ever increasing challenges of American agriculture. These schools are where we, the people, turn for unbiased, factual information. Without the continued strong support of the federal government, we are concerned about the future of the land-grant schools and the valuable contributions they make to improving the economic and social well-being of

America. I would encourage Congress to continue its past support by strengthening Title XIV of the Food Security Act.

It is the grassroots beginnings of the research and education process that has enabled this system to respond to America's needs. Local level users across America take seriously the mandate to look at their communities and determine what agricultural research and education programs need to be conducted to address current and future needs. This information then feeds into a statewide network whereby state agricultural experiment stations and Cooperative Extension Services establish the program priorities which best address the expressed needs. From the state level we feed into several national pipelines where the national emphasis is then addressed. Thus we have programs at all levels which complement and work to resolve the problems at all levels. You can see the program networking that is involved in establishing priorities on the federal, state and local levels. This partnership _is_ more than just funding sources.

We recognize that there are several proposals before this subcommittee which take into consideration the priority and planning process of the land-grant system. We trust that you will proceed cautiously as you look at possible revisions in this area. Any changes you make will have a direct effect on what happens in every home across this country.

Issues of significant importance such as: sustaining the productivity of our food and agricultural system; protecting the quality of the nation's water supply and our natural environment; meeting the nutritional needs of the entire population; implementing strategies to revitalize rural communities; competing more effectively in the international arena; adopting management practices that enhance animal health and welfare; developing new technologies and alternative crops; and, insurance of a safe food supply for the American public, are receiving increased attention as we work to finalize the 1990 Food Security Act. As we consider these issues and their relationship to Title XIV let us not get caught up in the excitement of the times but continue to look ahead to the future as we designate new directions and recognize that the land-grant system has been working in these areas already.

To use one example, the safety of our food supply has tended to polarize consumers, producers, and agribusiness. This polarization does not contribute to an environment which allows all concerned to come up with answers that satisfy the needs of each contending party. In this melee the land-grant system is, and needs to continue to be, the unbiased voice in resolving such conflicts.

In my home state of Pennsylvania, a large agricultural state, through the research and educational efforts of our land-grant school, Pennsylvania State University, our producers have come to rely on alternatives to traditional chemical usage. A program known as the Integrated Pest Management Program has enabled producers in my state to reduce chemical usage. Thus, when recent scares crossed our TVs, we were able to assure our local citizenry that our producers had already acted responsibly. We need to continue emphasis in such programs at the grassroots level with land-grant schools leading the way. By multiplying each state's efforts in similar programs this can lead to an increased understanding of how safe our U.S. food supply is and alleviate the concerns of the consumers.

Additionally, our land-grant system stands ready to instruct the consumer on the meaning of such terms as "parts per trillion," "risk versus benefits," "leeching," etc., and how that translates to a safe food supply.

Title XIV can serve as the catalyst in helping us reach solutions to the concerns facing American agriculture. To do so, a revised Title XIV must do the following:

1. maintain the Department of Agriculture as the lead agency in the federal government for the food and agricultural sciences;

2. strengthen the coordination and planning of the food and agricultural research, extension, and teaching programs (this should include identifying the needs and establishing program priorities);

3. assure that research results in the food and agricultural sciences are effectively communicated and demonstrated to producers, consumers, and all other users;

4. encourage continued cooperation between the federal government, the States, State agricultural experiment stations, colleges and universities, cooperative extension services, and user groups relating to food and agricultural sciences;

5. enable the federal government, the States, colleges and universities, and others to implement research, extension, and teaching programs in the food and agricultural sciences by improving existing programs and establishing new programs;

6. provide grants for facilities and instrumentation used in research for food and agriculture sciences; and,

7. award education grants and fellowships for research, extension, and teaching programs in the food and agricultural sciences.

I do not appear here today to just simply "rubber-stamp" business as usual in the land-grant system. This system is dynamic and constantly changing. However, I speak for the millions of users of this system who know how well it works and responds to our needs at the grassroots level. It is not perfect, but it is the best that we know of in the world.

Mr. Chairman, you and your colleagues have demonstrated your strong commitment to maintaining the efficiency and productivity of our food and agricultural system. I trust that your commitment will continue in efforts to revise and strengthen Title XIV so that this nation's agricultural system can safely and productively meet the demands of the 1990s and the next century.

I appreciate the opportunity to appear before you and to emphasize the importance of the research and education programs of the land-grant universities. As a receiver of these benefits, I can tell you that these programs make a difference in my life and in the lives of millions of Americans. We urge this committee to continue its commitment to the agricultural research and education programs of the land-grant system.

Thank you. I will be happy to answer any questions.

PREPARED STATEMENT OF JOHN R. BLOCK, PRESIDENT, NATIONAL-AMERICAN WHOLESALE GROCERS' ASSOCIATION (NAWGA), FALLS CHURCH, VA

Thank you Mr. Chairman. It is a pleasure to appear before this committee once again to discuss the vital subject of food and agriculture policy.

The National-American Wholesale Grocers' Association (NAWGA) is a national trade association comprised of food distribution companies which primarily supply and service independent grocers and foodservice operations throughout the United States and Canada. NAWGA's 350 members operate over 1,300 distribution centers nationwide with a combined annual sales volume in excess of $85 billion. NAWGA members employ more than 400,000 people nationwide; and, in combination with their independently owned customer firms, they provide employment for several million people. NAWGA's foodservice division, the International Foodservice Distributors Association (IFDA), represents member firms that sell annually over $22 billion in food and related products to restaurants, hospitals, and other institutional foodservice operations.

Mr. Chairman, I am pleased to note that work on this farm bill commences in a far different context than was the case with the Food Security Act of 1985. After nearly a decade of record growth and foreign demand for U.S. farm products, farm exports fell sharply in the early 1980's. Farm asset values, which had grown with exports, suddenly plunged as well. As a result, those who started or enlarged their operations at highly inflated farmland values of the late 1970's found themselves in a financial crisis. To a large extent, these problems were due to general economic factors—rapid appreciation in the value of the dollar, slowing rates of growth abroad, high real interest rates and international debt problems of several developing countries. However, U.S. farm policy shares in the blame. In escalating the level at which crop prices were supported, farm policy pushed U.S. prices above those of major foreign competitors, thereby undercutting U.S. competitiveness. In response to the sharp decline in the exports that started in 1982, government-owned stocks began to rapidly accumulate, adding further to the cost of farm programs.

From that adversity, leaders from both political parties worked together to forge an agricultural policy that would again make us competitive in world markets, be sensitive to the environment and return prosperity to American agriculture.

During development of the 1985 farm bill, I was pleased to work with four previous Secretaries of Agriculture to develop a joint statement of policy principles. It fairly well describes the approach taken in the 1985 farm bill, which has served us well. Since its enactment, American agriculture has enjoyed strong improvement in net cash farm income, as well as the value and the volume of U.S. farm exports. Also, we have seen improvements in the value of farm assets. In addition, our burdensome surplus stocks have been reduced and real aggregate farm debt has declined. Of course, government expenditures on this program have also been going down after the record high in fiscal year 1986.

We knew the costs of the 1985 farm bill would be great, but those actions were taken because returning American agriculture to a competitive basis was well worth the investment. Now, declarations of the success of the Food Security Act of 1985 are almost unanimous. I am concerned that we not become content with the 1985 bill's accomplishments and lose sight of the intended long-range course toward market orientation and a reduced reliance on government assistance. We must continue to review price and income support levels and allow producers greater discretion in meeting the aims of farm programs. The need for continuing these reforms of U.S. farm programs will only be strengthened if the Uruguay round of the GATT negotiations prove to be fruitful.

To be more specific, we offer several recommendations to continue strengthening of American agriculture's competitiveness. We should pursue with renewed vigor the principles of the 1985 farm bill. Specifically, loan rates must be set with a strong market orientation. Never again should U.S. policy price American commodities out of world markets.

Producers need greater discretion and flexibility in applying farm program provisions to their operations. Current practices of operating farm programs on crop-by-crop specific base plans deny flexibility in planning decisions and farmers are forced to plant certain program crops based on past practices. Farmers should be given greater flexibility in managing their resources to improve crop rotation practices and allow planning decisions more in line with market signals and prudent environmental practices. Senators Leahy and Lugar have introduced S. 2292, which appears to offer such flexibility.

A sad reality of agriculture policy is that as long as target prices expose the government to high budget costs, a strong temptation will be present to over-rely on acreage reduction programs. That temptation should be resisted. The United States remains the only major producer that uses massive supply management programs to adjust stocks.

At long last, dairy price supports generally have been brought back into balance with market conditions. Price support levels should continue to be adjusted based on estimates of Federal purchases. In addition, the increased value given to nonfat components of milk in the marketplace should be reflected in government purchases being made on the basis of total solids.

The selected use of Export Enhancement Program initiatives has helped recapture some markets lost because of unfair trade practices. Perhaps more important in the long term, the program is also giving incentive to GATT negotiators to accept new discipline for agricultural trade. This policy tool also needs to be continued.

We also have suggestions in the area of food safety. The manner in which we regulate pesticides has been a focus of increasing attention. Unfortunately, much of this debate has done nothing to increase public understanding about food safety. As the National Academy of Sciences has concluded, pesticide residues do not pose significant food safety problems. Nonetheless, it is important that we vigorously protect our food supply and environment with regulation of pesticides. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), it is important that we proceed with expeditious reregistration of older pesticides. In doing so, pesticide registration requirements must not become so onerous that vital pesticides are lost to so-called minor crops simply because the size of the market does not warrant the regulatory burden that the chemical manufacturer must face. Additionally, in streamlining procedures for cancellation and suspension of pesticides, it is important that we retain procedures that assure reasonable consideration of the reasons for continued use of a pesticide, particularly in light of last year's market terrorism regarding the chemical Alar.

A premise for many of this committee's actions since the 1930's has been the recognition that America's agriculture and food industries operate as a national, if not international, market. This fact should be reflected in our regulation of pesticide use. The considerable expertise of the Federal Government can be brought to bear on pesticide use issues with at least as much competence as any State. Moreover, responsible uniform regulation of pesticides will reduce the confusion and unjustified alarmism about food safety that has been far too prevalent in recent years.

Meat and poultry inspection is an important and effective element of our food safety system. We must assure that it is funded adequately to fulfill its mission. In addition, we favor establishment of a uniform mandatory seafood inspection program that would be administered by the USDA in consultation with appropriate other agencies. Such an inspection program should use Hazard Analysis Critical Control Point (HACCP) principles and be federally funded.

One of the major environmental accomplishments of the 1985 farm bill was the adoption of a Conservation Reserve Program (CRP). Almost 34 million acres of land are now under contract to help conserve and improve soil and water resources. The most fragile lands that were in cultivation have been enrolled in the CRP. We endorse the extension of the Conservation Reserve Program with authority for up to 40 million acres enrollment of fragile lands.

In recent years, up to 1 in every 10 Americans has had to rely on the Food Stamp Program. A great strength of the Food Stamp Program is the accessibility of grocers who are authorized to redeem food stamp coupons. In the 1960's, the Department of Agriculture had difficulty obtaining the participation of grocers in the Food Stamp Program. However, now that there is strong participation by grocery retailers, the Department has been increasingly restrictive in its regulation of groceries authorized to participate in the Food Stamp Program. This year the Department has proposed further restrictions on retail food stores with the rationale of preventing program abuse.

Indeed, I am proud of the reductions in food stamp error rates and other abuse that were made during my time at the Department of Agriculture. With the rationale of preventing abuse, the Department has now proposed a series of restrictions on stores participating in the Food Stamp Program. Of course, the vast majority of abuse of the Food Stamp Program does not occur with grocers. Moreover, what abuse does occur at that level would generally not be prevented by these proposals. We have contacted the Department to express our eagerness to work with them to improve anti-fraud program features. Until that sort of cooperation occurs, we cannot be supportive of the several departmental proposals. What practical effect would result from requiring all officers, owners and onsite managers of food stores to disclose their social security numbers to the Food and Nutrition Service? How much real abuse would be halted by biennial reauthorization of stores or the prohibition of receipt of a loose food stamp coupon? Moreover, the Department of Agriculture has simply not made its case for additional restrictions on colocated wholesale/retail food concerns.

It is essential that the Department's proposal that would generally require any colocated wholesale/retail food concern to have a "substantial level of retail food business" not be measured by a percentage of the food concern's total sales. Given the highly restrictive character of recent departmental actions toward authorized stores, precise definition of this proposal is crucial to us.

The requirement that the social security numbers of the officers, owners and onsite managers of participating food concerns appears to be an unjustified invasion of the privacy of upstanding private citizens. The Department has not yet explained precisely how this information would be used and protected. We must oppose such an invasion of privacy until compelling justification is provided.

We at NAWGA are deeply concerned about the proposal for biennial reauthorization of participating food stores and the proposed unlimited authority for USDA to charge participating grocers a user fee for such reauthorizations. We do not recognize any significant benefits that would outweigh the inconvenience and expense of over 125,000 reauthorizations each year.

We are supportive of expansion of food stamp Elections Benefit Transfer (EBT) activities. Of course, it is important that USDA maintain high standards for EBT activities.

Finally, Mr. Chairman, there are several additional recommendations that I would like to make for the committee's consideration, though they do not necessarily reflect the position of the National-American Wholesale Grocers' Association. Our Federal Crop Insurance Program has been a valiant effort in a vital cause that has simply fallen short of the mark. It has proven to be tremendously expensive and participation has remained unacceptably low. Repeatedly, Congress has found it necessary to enact disaster assistance legislation. We should now face the fact that Federal crop insurance simply is not working and should be eliminated.

There is sufficient credit availability and excellent capability to service farm operating and ownership lending needs through institutions other than the Farmers Home Administration. The Farmers Home Administration should limit its farm lending activitics to guarantees and not continue to engage in direct lending activities.

American agriculture must continue to be environmentally responsible. One area of growing concern is the quality of our ground water, which serves as a major source of U.S. drinking water. A calm, reasoned approach will best serve the interests of environmental protection and continued economic growth. We must get the facts through responsible ground water testing and continued research. Thereby, to the extent ground water contamination problems arise, we will be prepared to use techniques that are appropriately tailored to the particular problem. Ground water quality is too important to ignore and a regulatory overreaction to ground water problems would be too economically damaging to withstand.

I appreciate the opportunity to appear before this committee once again. I would be pleased to answer any questions.

Prepared Statement of Dr. John N. Walker, P.E., President, the American Society of Agricultural Engineers (ASAE)

Mr. Chairman, I am John N. Walker, president of the American Society of Agricultural Engineers (ASAE). Our Society is a professional and technical organization of 10,000 members worldwide, who are dedicated to the advancement of engineering applicable to agriculture and other biological systems, including the environment and natural resources, and associated industries. Our members are the people who turn ideas into the systems and equipment for society to use.

The purpose of this testimony is: (1) to confirm the importance of this initiative; (2) to emphasize the need for a balanced approach for the funding; (3) to address the need to increase authorization up to $500 million or to authorize sufficient funds to adequately carry out this national initiative.

The report of the National Academy of Sciences calls for a bold new research initiative for agriculture. It documents the broad societal issues that are critical to this major U.S. industry and to every citizen of this country. These issues include: (1) restoring and protecting our natural resources and the environment; (2) maintaining and enhancing the competitiveness of U.S. agriculture in the international market place; (3) assuring the dietary health and well-being of our citizens; and (4) making an investment in the future well-being of the country through excellence in science and education.

President Bush's budget for fiscal year 1991 includes $100 million in the USDA/CSRS budget for the National Initiative for Research on Agriculture, Food and the Environment. However, this amount represents just partial funding and includes only four of the six proposed program areas contained in the National Academy of Sciences' report.

It is ASAE's position that it is vitally important to fund implementation of the proposal with a holistic approach that balances investment in all of the six program areas.

Research in practices to manage our "Natural Resources and Environment" must be accompanied by engineered systems. Particularly in the Water Quality and Management Initiatives, it is essential to engineer processes and procedures to reduce the risk of contamination and to integrate systems to increase total water yield while conserving water supplies and preventing soil erosion. A third of our engineering members are working in projects to sustain agriculture, to conserve soil and to protect our biosphere.

For the total program to be effective, funding should be provided for engineering in the "New Products, Process and Value-added Area." There is great potential for engineering development to bring new agricultural products to the commercialization stage and to devise systems that will add value to U.S. agricultural commodities. To realize this potential, the United States must invest in the engineering and research necessary to transform knowledge into useful products and services.

We believe strongly that our nation's best interests are served by investing in competitive grants for all six research areas identified in the National Academy of Sciences' report. This National Initiative is substantially different from previous programs. The expanded competitive grants program will provide better balance, basing new funding on relevance and quality in the six research areas. It is imperative that the initiative funding contain a component for engineering products and processes.

Engineering, when integrated with the multidisciplinary teams called for in the study, will design the applications that result in a more competitive agriculture. This multidisciplinary team approach is key to the success of the research effort.

Finally, we are highly supportive of the USDA's program plan for the $500 million per year initiative implementing the recommendations of the National Academy of Sciences. We believe that the funding level must be at levels higher than those proposed by the administration. The needs of the agricultural community and the citizens of this country demand full implementation of the plan in all six areas of research in FY 1991.

ASAE considers it a privilege and a responsibility to join the Coalition for Advancement of Research on Agriculture, Food and Environment (CARAFE) in urging Congress to increase the authorization for competitive grants to fully support the national initiative.

On behalf of all of the 10,000 members of ASAE, I want to express appreciation for the opportunity to provide this testimony on a very critical issue.

PREPARED STATEMENT OF DR. NEVILLE P. CLARKE, COORDINATOR, THE COALITION FOR ADVANCEMENT OF RESEARCH ON AGRICULTURE, FOOD AND ENVIRONMENT (CARAFE)

Mr. Chairman, my name is Neville P. Clarke; I am Associate Deputy Chancellor for Agriculture in the Texas A&M University System. I also serve as Coordinator of the Coalition for Advancement of Research on Agriculture, Food and Environment (CARAFE), which is a network of advocates for the National Initiative for Research on Agriculture, Food and Environment.

The purpose of this testimony is to (1) briefly relate the importance of the initiative, (2) define CARAFE and its current membership and address its endorsement of the National Initiative, (3) speak to the need for expanded authorization for competitive grants to cover the program plan for the national initiative and (4) comment on the budget recommendation of the administration for the national initiative in FY 1991 and future years and the USDA Program Plan for the initiative.

The National Initiative for Research on Agriculture, Food and Environment (NIRAFE) is a new program of research in agricultural, life, engineering and social sciences that addresses critical problems and opportunities in agriculture, food and environment. The program was proposed by the National Academy of Sciences/National Research Council's Board on Agriculture (October 1989). It is defined by a broad consensus of industrial, environmental, consumer and academic interests.

NIRAFE will ultimately be funded at $500 million per year and with competitive grants awarded on relevance and merit. NIRAFE includes both basic and mission linked research and a program of strengthening grants to develop new capability in smaller institutions and to support graduate education. All academic institutions, Federal research agencies and not-for-profit entities are eligible to receive funds.

NIRAFE addresses the most urgent problems related to agriculture, the environment and food. It deals with issues that have major impact on every citizen of this country and on the continued health and vigor of its largest industry. Funding for agricultural research has been virtually stagnant for almost 20 years, in the face of both increasing problems and broadening of the mission to include greater emphasis on environmental and food issues.

The Coalition for Advancement of Research on Agriculture, Food and Environment (CARAFE) is a network of advocates for NIRAFE. More than 130 organizations are members of the coalition with representation from academic institutions, industry, environmental and consumer groups and scientific societies. There are member institutions of CARAFE from the State of every member of this subcommittee.

There are more than 70 universities named by the President or Chancellor as member of CARAFE. This includes members of the National Association of State Universities and Land-Grant Colleges (NASULGC), the Association of American Universities and the American Association of State Colleges and Universities. There are 22 non-land-grant universities in CARAFE. Thirty professional and scientific societies, several of which represent multiple societies have joined the Coalition as have almost 20 national level commodity groups, industries and others. The Council of Scientific Society Presidents, representing more than 36 organizations with a scientist membership of more than 800,000 members is a member of CARAFE.

We enter this information on CARAFE to demonstrate a unique breadth of support for the national initiative. All members of the Coalition fully support the $500 million per year program plan of USDA and the National Academy of Sciences; all urge the support of the administration and the Congress for the initiative. All elements of the Division of Agriculture of NASULGC fully support the initiative.

The USDA's Program Plan for the National Initiative is a multiyear proposal with new funding beginning in FY 1991. The President's budget proposal contains $100 million for NIRAFE; $42.6 million are related to existing programs. The administration has made (for USDA) an unprecedented commitment to out-year funding increases until a total of $300 million is achieved. The USDA program plan is for $500 million.

For the National Initiative to be fully funded in FY 1991 and the years immediately following, it will be important to increase the authorization for Competitive Grants in USDA to $500 million per year. CARAFE and its members urge this subcommittee to take that action in revisions to title XIV of the 1990 farm bill. Alternatively, language that provides such funds as may be necessary to carry out the competitive grants programs of USDA would meet the needs of the National Initiative.

Mr. Chairman, CARAFE wishes to commend the administration for initiating the National Initiative in its FY 1991 budget request. We are also highly supportive of the USDA's Program Plan for the $500 million per year initiative implementing the recommendations of the National Academy of Sciences and the legislation previously introduced by Mr. McCloskey. It is highly significant that the administration has committed out-year resources to the initiative, a first for Science and Education in USDA. It is also critically important that the administration has not proposed funds for the initiative at the expense of other vitally important and equally necessary ongoing research, education and extension. CARAFE feels that both the FY 1991 and out-year funding should be at levels higher than proposed by the administration because of the compelling urgency of need and the importance of initiating all six areas of research, in FY 1991, rather than the four recommended by the administration.

These strong commitments by the administration, along with the broad interest shown by the Congress and the CARAFE constituency in the Initiative appear to more than justify the increased authorization for competitive grants that would allow for full funding of NIRAFE.

On behalf of CARAFE and all its constituent members, we appreciate the opportunity to make this testimony.

PREPARED STATEMENT OF THE HUMANE SOCIETY OF THE UNITED STATES (HSUS), WASHINGTON, DC

The Humane Society of the United States (HSUS) appreciates the opportunity to submit testimony on the U.S. Department of Agriculture's Low-Input Sustainable Agriculture Program (LISA) and S. 2334 (Leahy-VT), the proposed Sustainable Agriculture Research and Education Act of 1990.

The HSUS is the Nation's largest animal protection organization, with more than 1 million members and constituents. We are chartered for the purpose of preventing suffering and abuse to animals. We pursue this objective through education, investigation, litigation, and legislation.

As you know, agricultural research has been directed toward high-input, capital intensive systems of agriculture for the last 40 years. While these systems have produced benefits to society, there are also serious environmental, economic and other problems associated with some of these practices. For example, the National Academy of Sciences has identified agriculture as the largest nonpoint source of water pollution in our Nation.

The HSUS shares the increasing concern about these environmental problems because animal agriculture plays a major role in the overall U.S. agriculture program. In 1988, animal agriculture represented 53 percent of the $83 billion in overall agricultural cash receipts in 1988. We know that many farmers are looking for alternatives to high-input systems—systems which we believe will benefit farmers, farm animals and the environment.

For this reason, the HSUS developed our Humane Sustainable Agriculture (HSA) program in April of 1989. This program recognizes that many farmers are practicing—or seeking information on—alternative agriculture practices. Practices that promote strong thriving rural communities, and environmentally sound land, water and air also provide an environment of ecological relationships conducive to optimum health for humans, wildlife and farm animals. We are working with organic farmers in particular because we believe they have a philosophy and approach to farming and ecology that is conducive to improving the environmental, animal welfare *and* the Nation's agricultural needs.

In talking with farmers over the past 2 years, the HSUS has found that many want to develop alternative systems which implement low-input sustainable agriculture practices. We believe the best approach is to integrate livestock and crop systems where possible.

Current farming regulation and a lack of information on sustainable agriculture represents the greatest barriers to progress by researchers and farmers who wish to move to such alternatives. Therefore, we recommend the mandated scope of the original LISA project, as outlined in the Food Security Act of 1985 (Public Law 99-198), be expanded to cover monocultural *animal* systems as well as monocultural cropping systems.

Monocultural animal systems have become standard in the chicken industry and are now invading the cattle and swine industries. In 1960, 286 firms were selling commercially raised fryers to retailers. Today there are 48. In beef, the rate of concentration is unprecedented. Three beef packers have captured 77 percent of the beef market. In 1977, 35 percent of all hogs were raised in intensive confinement units with more than 500 head. In 1987, 57 percent of hogs were raised in this way. Four companies control 31 percent of the market. By 1993 they will control 60-70 percent.[1]

These intensive systems are contributing to animal death and disease losses, which are now costing billions of dollars per year. Beef and dairy cattle deaths alone are estimated at $4.6 billion. Respiratory infections in cattle and swine result in estimated losses of $800 million per year. Approximately 50 percent of dairy cattle in the United States have mastitis, and beef feedlot deaths average an astronomical 6 percent per year—1.5 million animals. Broken bones associated with osteopenia in laying hens continue to be a problem—31 percent of the battery hens sampled in a recent study had broken bones when examined prior to slaughter. Necropsy studies of slaughtered hogs have revealed a 30-80 percent incidence of pneumonia, up to 90 percent had osteochondrosis (which can lead to painful joint disease) and 10-30 percent had gastric ulcers.

The HSUS commends Senators Leahy, Daschle, Harkin and Kohl for introducing S. 2334. We support increased funding of $40 million for title I and the LISA Program, and the explicit intent of the bill to make animal agriculture an integral part of the program. We specifically support the following:

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[1] National Family Farm Coalition testimony before the Subcommittee on Agricultural Production and Stabilization of Prices of the Committee on Agriculture, Nutrition, and Forestry, September 15, 1989 (Part VI, S. Hrg. 101-259).

1. Title I, section 101(a)(5)(F)—recognition of the one need to explore alternative production systems.
2. Title I, section 101(b)(5)—recognition of the need to promote the humane treatment of animals.
3. Title I, section 104(a)(5)—inclusion of nonprofit organizations on the National Sustainable Agriculture Advisory Council and Regional Administrative Councils.
4. Title I, section 106—providing for technical guides for low-input systems, especially to address ground water pollution. We would like to particularly emphasize the need for increased research, education and action because animal waste in monocultural animal systems is a major ground water pollution problem.
5. Title IV, Biotechnology Risk Assessment Research.

We also support research and development of livestock and poultry husbandry systems by land-grant colleges to help in the design of husbandry systems that provide animals with environments maximizing their physical well-being, behavioral requirements and productivity.

Our agriculture industry is the most important and most productive industry in North America. An ancient proverb says that "civilization is like a tree with agriculture as its roots and commerce the branches and leaves. If the roots suffer, the leaves and branches will fall off and the tree will die." In other words, agriculture is vital to the economy—and to our whole way of life. However, for all our productivity, our "efficiency" is diminishing these roots and, indeed our leaves and branches are falling off. Without a sustainable agriculture—one that interacts positively with the Earth and all its creatures—the tree of life will die.

The less than one-half of 1 percent of USDA's research budget allotted to the LISA project has already demonstrated that research can uncover effective, profitable alternative management practices. The research conducted at South Dakota State University, with the help of LISA funding, has demonstrated that properly managed low-input farming systems are in many instances *more* profitable than conventional systems. Research of this kind, that makes it more profitable to put livestock back on the land in integrated farms, can go a long way toward eliminating livestock-related pollution of the environment. We urge the subcommittee to increase both the scope and funds for LISA research.

PREPARED STATEMENT OF DR. R.A. MOORE, DIRECTOR, SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION, SOUTH DAKOTA STATE UNIVERSITY, BROOKINGS, SD, ON BEHALF OF THE NATIONAL INITIATIVE FOR RESEARCH ON AGRICULTURE, FOOD, AND ENVIRONMENT

As Director of the South Dakota Agricultural Experiment Station (SDAES), I support the national initiative for research on agriculture, food, and the environment.

We are being challenged by the agricultural competitiveness of other nations. In most cases, this is a result of their greater emphasis on agricultural research. We must maintain a leadership role. We have a large land area and a climate that are both very suitable to agriculture. We have achieved great efficiencies in production, processing, packaging, and marketing of agricultural products, yet nearly 20 percent of our total work force is involved, thus making agriculture the No. 1 industry in America.

This remarkable efficiency has been achieved at some costs. Our environment is showing its fragility, our natural resources must receive better protection. We must be sure that our food will always be as nutritious and as safe as it can be.

For these reasons, we must inject new life into our agricultural and environmental research. For too long (some two decades) we in the State experiment stations have been struggling with only minimal Federal funding to provide the research base for the expanding food and fiber needs of a country (and a world) with rising consumer expectations. I want to emphasize that the initiative requests new funding. We cannot subtract from other programs.

I also must emphasize that our State of South Dakota, with its limited financial resources, needs the stability of formula funding to keep our base programs intact.

However, we welcome the challenge of competitive research funding. We strongly support the manner of funding which this initiative will use. Strengthening grants will benefit small institutions such as ours. We believe we in South Dakota are in a strong position to make a major contribution.

We will use new tools—genetic engineering and biotechnology—to tap unused resources in South Dakota. South Dakota has 24 million acres of native grasslands.

Numerous exotic species are abundant in these prairies. Many have characteristics that, if successfully incorporated into economic plants, would reduce our need for chemicals. With recombinant DNA we will move desirable traits from one species into others. We will work to transfer the weed resistance of western wheatgrass into other economic plants. The need for environmentally threatening chemicals will decline if we incorporate the natural insecticides found in the *Echinacea* species into sunflowers (South Dakota ranks second in the United States in sunflower production). We will work in other ways to develop built-in mechanisms in both plants and animals to achieve resistance to various pests.

Such research relates directly to the national initiative. We in South Dakota are prepared to be competitive in these areas.

The National Academy of Sciences and National Research Council Board on Agriculture proposed the initiative in response to urgent needs. South Dakota State University was one of the first to join the Coalition for Advancement of Research on Agriculture, Food, and Environment (CARAFE).

As Director of the SDAES, I urge that funding be authorized for $150 million in FY 1991 and that this be increased until the entire USDA program plan for the full $500 million is achieved.

The administration is to be commended for its support of the initiative at $100 million for FY 1991 and to increase funding by $50 million a year in each of the outyears. This is, however, at the expense of two of the six areas recommended in the initiative. We must not exclude programs on markets and trade policy or on new products and new ways to add value to raw products. This is no time to stop short. All six program areas of the national initiative should be implemented.

We will continue to provide the most nutritious and the most healthful food in the world—and do it with efficiency, and we will protect our environment and conserve our natural resources—for ourselves and for the future.

Thank you.

PREPARED STATEMENT OF THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

The American Institute of Biological Sciences (AIBS) appreciates the opportunity to comment on title XIV of the 1990 farm bill. AIBS was founded in 1947 under Federal charter within the National Academy of Sciences to promote basic research and educational opportunities in the agricultural, biomedical, and environmental sciences. Today AIBS is an independent federation of over 40 scientific societies and research laboratories representing over 70,000 individual biologists.

AIBS strongly endorses the findings of the National Research Council's *Investing in Research* report which recommends an increase in competitive grants funding for agricultural research to $500 million annually. We believe this proposal will best promote a continued supply of nutritional, low-cost food. In addition, the NRC proposes adequate funding of promising research opportunities with a focus on interdisciplinary research. Adequate funding of competitive grants also encourages scientists from fields not traditionally associated with agricultural science to consider applying their skills to agricultural problems.

The spectrum of agricultural issues with which AIBS is concerned includes sustainability of food and fiber production, natural resources conservation, pollution control, and human health. We believe the most effective method of addressing these issues is through basic scientific research. Currently, only a small proportion of agricultural research is for basic scientific research, far below the level expended for research by Federal research missions conducted by the National Institutes of Health, the National Science Foundation, the Department of Energy, or NASA. Basic research provides the fundamental understanding of science principles so vital to furthering technological advances in any field of study.

AIBS supports the implementation of the research initiative through the competitive grants system because this system presents the widest opportunity for advancing agricultural research. Competitive grants are awarded on the basis of merit and attract scientists from various disciplines. This encourages communication and links across scientific disciplines thereby promoting even greater advancements in the agricultural sciences. In addition, peer review of competitive grant applications and the annual cycle of proposals and awards ensures that agricultural research will be at the forefront of science. Commitments are for finite lengths of time, and allow the competitive grants system to change significantly in relatively short periods of time in response to scientific advances.

Interdisciplinary research will dominate agricultural science in foreseeable future. Advances in genetics, ecology, and all the other biological sciences are converging to offer a new scientific platform for enhancing agricultural productivity. The Green Revolution of the 1960's and 1970's was largely the result of applying basic research conducted in the biological sciences to agriculture. There are currently several opportunities for advancing agriculture through application of recent scientific discoveries. These opportunities include developing genetically engineered crops and forest trees that are tolerant of stress, pathogens, and parasites, and developing management systems that optimize the use of energy, water, and nutrients in agricultural and forest production ecosystems. Technological developments in the biological sciences ensures continued advances in agriculture, but these developments come only through continued support for basic scientific research. AIBS believes fully funding the agricultural research initiative at the $500 million level proposed by the NRC provides the highest assurance of continuing the plentiful supply of agricultural products.

Future research efforts will undoubtedly reduce economic losses in the agricultural community. Each year, billions of dollars worth of agricultural crops are lost to pests and disease, including an estimated $4 billion just due to soilborne fungi and a few types of bacteria. The $500 million recommendation is a very small percentage of the total crop damage lost annually, and the return on this research investment accrues to future generations.

Increased public awareness of the environmental effects of traditional agricultural practices indicates a need to address these concerns through research efforts aimed at alleviating the problems. For example, pesticide residue in ground water suggests research into biological controls of pests and weeds is warranted. In addition, public concern with the nutritional quality of foods underscores the need to provide support for improving the nutritional composition of foods.

AIBS is a member of two coalitions supporting increased investment in agricultural science. The goal of the Coalition on Federal Agriculture Research Missions (C0FARM) is the provision of increased support for the scientific and technological base of agricultural research. COFARM represents about 128,000 individuals engaged in research efforts. The Coalition for Advancement of Research on Agriculture, Food, and Environment (CARAFE) is a broad-based coalition representing groups with interests ranging from nutrition and food industry issues to environmental and scientific research concerns.

II

101st CONGRESS
2d Session

S. 2259

To authorize agricultural research programs, and modify agricultural research planning and priority setting mechanisms, and for other purposes.

IN THE SENATE OF THE UNITED STATES

March 8 (legislative day, January 23), 1990

Mr. Daschle (for himself and Mr. Leahy) introduced the following bill; which was read twice and referred to the Committee on Agriculture, Nutrition, and Forestry

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A BILL

To authorize agricultural research programs, and modify agricultural research planning and priority setting mechanisms, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS; REFERENCES.

(a) Short Title.—This Act may be cited as the "Agricultural Research and Extension Planning, Priority Setting, and Technology Assessment Act of 1990".

(b) Table of Contents.—The table of contents is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Findings.
Sec. 3. Purposes.

TITLE I—PRIORITIES FOR THE AGRICULTURAL RESEARCH AND EXTENSION SYSTEM

Sec. 101. Statement of purposes for agricultural research and extension.
Sec. 102. Application of purposes to agricultural research and extension projects.

TITLE II—AGRICULTURAL RESEARCH PLANNING AND PRIORITY-SETTING ENTITIES

Sec. 201. National Agricultural Research and Extension Users Advisory Board.
Sec. 202. Joint Council on Food and Agricultural Sciences.
Sec. 203. Agricultural Science and Technology Review Board.
Sec. 204. National Clearinghouse on Agricultural Scientific Talent.

TITLE III—AGRICULTURAL RESEARCH AND EXTENSION FUNDING PROGRAMS

Sec. 301. Competitive grants for agricultural, food, and environmental research.
Sec. 302. Sense of Congress regarding formula funding for agricultural research and extension.

(c) REFERENCES.—Whenever in this Act an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or provision of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3101 et seq.), except to the extent otherwise specifically provided.

SEC. 2. FINDINGS.

Congress finds that—

(1) significant amounts of agricultural research and training of agricultural research scientists are being conducted outside of the land-grant university system and the traditional colleges of agriculture;

(2) significant amounts of Federal funding for agricultural research are being provided by Government

agencies outside of the United States Department of Agriculture, such as the National Institutes of Health, the National Science Foundation, the Department of Energy, the Department of the Interior, the Department of Defense, and the Environmental Protection Agency;

(3) the present agricultural planning and priority setting mechanisms (the Joint Council on Food and Agricultural Sciences and National Agricultural Research and Extension Users Advisory Board) lack the scope and authority to perform adequate technology assessment of emerging agricultural priorities and research accomplishments;

(4) the federally supported agricultural research and extension system needs to develop a clearer vision of its mission, and more specificity and clarity in stating priorities for the system;

(5) planning and priority setting in the federally supported agricultural research and extension system is ineffective, in part, because there is no mechanism to assure follow through on initiatives of the Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board;

(6) agricultural scientists need to become more involved in multidisciplinary research;

(7) the federally supported agricultural research community is emphasizing basic research and this has resulted in decreased emphasis in areas of applied research and technology transfer;

(8) agricultural research has a profound influence on the structure of agriculture, the quality of rural life, and the environment;

(9) if publicly funded agricultural research and extension is to provide the maximum possible positive contribution to the betterment of society, research and extension priorities must be shaped to advance established societal goals, with the assistance of information provided by technology assessment;

(10) it is the historical policy of the United States to foster and encourage the family farm system of agriculture as essential to the social well-being of the United States and efficient agricultural production;

(11) such a system is best characterized by large numbers of small and moderate-sized, owner-operated, ethnically diverse, family farms that result in more socially and economically strong rural communities and high quality rural life;

(12) long-term food security would be enhanced by improved soil and water conservation, increased genetic diversity, and greater reliance on renewable resources for agricultural production;

(13) the agricultural production system, with its special reliance on the environment, is more susceptible than other industries to economic collapse if the natural biological systems fail to operate properly;

(14) increasing numbers of agricultural producers and urban consumers are concerned about farm profitability, soil erosion, water quality and quantity, and the impact of agricultural chemicals on human health and the environment;

(15) greater cooperation is needed among the public and private agricultural research and extension system to address these concerns; and

(16) diversified agricultural production reduces financial risk, the market consequences of overproduction, and expands agronomic crop management options.

SEC. 3. PURPOSES.

It is the purpose of this Act—

(1) to establish purposes and procedures for federally funded agricultural research and extension programs;

(2) to encourage the agricultural research and extension community to evaluate the technological consequences of the research that it performs, and to direct its research and extension activities toward advancing the purposes for agricultural research;

(3) to improve the present agricultural research planning and priority-setting entities; and

(4) to improve the competitive grant system used by the Secretary of Agriculture.

TITLE I—PRIORITIES FOR AGRICULTURAL RESEARCH AND EXTENSION SYSTEM

SEC. 101. STATEMENT OF PURPOSES FOR AGRICULTURAL RESEARCH AND EXTENSION.

The Act is amended by inserting after section 1403 (7 U.S.C. 3102) the following new section:

"SEC. 1403A. STATEMENT OF PURPOSES FOR AGRICULTURAL RESEARCH AND EXTENSION.

"(a) PRIMARY PURPOSE.—The primary purpose of Federal involvement in both basic and applied agricultural research and extension activities shall be to—

"(1) enhance the sustainability and competitiveness of the food production and agricultural system of the United States; and

"(2) best ensure that it maximizes competitiveness and the social, environmental, human health and food security interests of the United States.

"(b) SPECIFIC PURPOSES.—Subject to the varying conditions and needs of States, to carry out subsection (a), federally funded agricultural research and extension programs shall—

"(1) increase employment opportunities (especially self-employment) in agricultural and rural communities, strengthen the family farm system of agriculture, enhance the competitive position of small- and moderate-sized, owner-operated farms upon which the operators rely for a significant portion of their income, contribute to a more equitable rural, social, and economic structure, and enhance the social and economic vivacity and quality of life of rural communities;

"(2) protect the environment and natural resources, including reducing soil erosion, enhancing wildlife habitat and populations, protecting ground water and surface water from pollution from sediment, nutrients, synthetic chemicals, and other potential pollutants;

"(3) enhance human health by fostering the availability and affordability of a safe, wholesome, healthful, and nutritious food supply and by developing farming systems without adverse impacts on the health of consumers, farmers, farmworkers, and other persons involved in the food and farm system;

"(4) enhance the resiliency and competitiveness of the food and farm system to ensure long-term food security and affordability by—

"(A) reducing reliance on consumptive use of nonrenewable resources, including petroleum and other nonrenewable sources of energy;

"(B) preserving, enhancing, and sustaining the productivity of natural resources, including farmland;

"(C) maintaining genetic and species diversity; and

"(D) developing farming systems capable of meeting future food and farm product needs; and

"(5) enhance the efficiency, profitability, and competitiveness of United States agriculture through the development of production systems that address constraints facing producers and that allow the producers, through more intensive application and use of management, skilled labor, and other means to reduce production costs.

"(c) PROGRAMS.—To foster the purposes described in subsections (a) and (b), agricultural research and extension programs should emphasize—

"(1) development of farming systems that take greater advantage of natural processes and beneficial onfarm biological interactions so as to sustain and enhance the interactions for use in agronomic and livestock farm management, including—

"(A) enhanced management of fertilizers, pesticides, animal drugs, and onfarm inputs;

"(B) use and development of integrated pest management systems and biological controls for insects, weeds, and plant pathogens;

"(C) soil management systems that reduce soil erosion, use cover crops, crop residues, crop rotation, and legumes as nitrogen sources; and

"(D) environmentally sound application of animal manure;

"(2) agroecology research aimed at developing an understanding of the ecology of agricultural ecosystems and the interaction among living organisms, environmental conditions, and farming practices;

"(3) genetics research (using both traditional approaches and biotechnology) that result in crop varieties and livestock that enhance management options, farm productivity, use of onfarm inputs, and a diversity of products that can be marketed by the farm operator;

"(4) research to develop farming systems appropriate to an era of climatological uncertainty, including development of more drought tolerant plants and farming systems that conserve moisture, and plants and livestock that are adaptable to shifts in climate;

"(5) research to increase the demand for current farm products, and to develop new farm crops and enterprises, that are socially, economically, and environmentally advantageous and enhance agricultural diversity, including—

"(A) new crops and new uses for existing crops that can be grown on highly erodible land at acceptable rates of soil erosion;

"(B) new uses for existing crops and new crops that when added to rotations with major crops reduce soil erosion and the need for substantial off-farm inputs;

"(C) new crops and products that are environmentally sound and appropriate to small- and moderate-sized family farms; and

"(D) processing techniques for agricultural products that are appropriate to location on farms and in small rural communities;

"(6) research to enhance the profitability and productivity of soil conserving land uses and farming systems that rely on long-term perennial plant systems, including greater reliance on forages and development of livestock systems that improve the utilization of forage products;

"(7) research that develops—

"(A) rural development strategies that build on the entrepreneurial skills, self-employment tradition, and agricultural resource base of farm-dependent communities; and

"(B) extension programs to disseminate those strategies and provide technical assistance to grassroots, self-help rural community development efforts, including those aimed particularly at increasing economic opportunities of minorities and low income individuals;

"(8) innovative extension and education programs that transfer new technology to the agricultural community and to widely reach small- and moderate-sized family farmers, including potential beginning and minority farmers with limited resources (who might otherwise fail to keep pace with rapidly changing technology) to enhance their management capabilities and inform them of established and emerging technological and farming systems alternatives appropriate to small- and moderate-sized family farms; and

"(9) extension programs that are adequately funded and staffed and substantially involve a broad range of interested individuals, commodity groups, agri-industry groups, farm groups, rural organizations, community groups, farm worker groups, food groups, church groups, and environmental organizations to broaden input into research and extension priority setting.".

SEC. 102. APPLICATION OF PURPOSES TO AGRICULTURAL RESEARCH AND EXTENSION PROJECTS.

The Act is amended by inserting before section 1407 (7 U.S.C. 3122) the following new section:

"SEC 1406A. APPLICATION OF PURPOSES TO AGRICULTURAL RESEARCH AND EXTENSION PROJECTS.

"(a) REGULATIONS.—

"(1) IN GENERAL.—Not later than 18 months after the date of enactment of this section, the Secretary shall promulgate regulations (in accordance with subchapter II of chapter 5, United States Code) interpreting and applying the purposes stated in section 1403A to agricultural research and extension projects administered by the Secretary and informing persons participating in the programs of the purposes.

"(2) COMMENT PERIOD.—The comment period for promulgation of regulations under paragraph (1) shall be not less than 60 days.

"(3) DISSEMINATION OF PROPOSED REGULATIONS.—In addition to publication in the Federal register, the Secretary shall disseminate the notice of proposed rulemaking incorporating the proposed regulations required by paragraph (1) as broadly as possible to all persons who may wish to comment on the regulations.

"(b) IDENTIFICATION OF PURPOSES IN AGRICULTURAL RESEARCH AND EXTENSION PROJECTS.—Except as provided in subsection (c), whenever an agricultural research or extension project that is funded at a level of $10,000 or more by funds made available under Federal law is proposed to be undertaken or approved by the Secretary, the project proposal shall identify—

"(1) the purposes that the project seeks to further; and

"(2) the effects of the project on—

"(A) the purposes stated in section 1403A;

"(B) the purposes underlying the law authorizing the project; and

"(C) the annual and 5-year plan for research, teaching, and extension prepared by the Joint Council and the Advisory Board.

"(c) RELATIONSHIP TO OTHER LAWS.—Subsection (b) shall not override requirements for specifying objectives of projects to be funded that are prescribed under—

"(1) the Act of March 2, 1887 (24 Stat. 440, chapter 314; 7 U.S.C. 361a et seq.) (commonly known as the 'Hatch Act of 1887'); or

"(2) the Act of May 8, 1914 (38 Stat. 372, chapter 79; 7 U.S.C. 341 et seq.) (commonly known as the 'Smith-Lever Act').".

TITLE II—AGRICULTURAL RESEARCH PLANNING AND PRIORITY-SETTING ENTITIES

SEC. 201. NATIONAL AGRICULTURAL RESEARCH AND EXTENSION USERS ADVISORY BOARD.

Section 1408 (7 U.S.C. 1323) is amended to read as follows:

"SEC. 1408. NATIONAL AGRICULTURAL RESEARCH AND EXTENSION USERS ADVISORY BOARD.

"(a) ESTABLISHMENT.—The Secretary shall establish within the Department of Agriculture a board to be known as the National Agricultural Research and Extension Users

Advisory Board which shall have a term that expires September 30, 1995.

"(b) MEMBERSHIP.—The Advisory Board shall be composed of 16 members elected by their constituent groups, and serving staggered terms, in a manner determined by the Secretary, with

"(1) one member representing farm cooperatives;

"(2) two members representing general farm organizations;

"(3) two members representing crop and livestock commodity groups;

"(4) one member representing agricultural farm suppliers;

"(5) one member representing food and fiber processors;

"(6) one member representing food marketing interests;

"(7) one member representing animal health interests;

"(8) one member engaged in transportation of food and agricultural products to domestic or foreign markets;

"(9) one member representing labor organizations primarily concerned with the production, processing, distribution, or transport of food and agricultural products;

"(10) one member representing private nonprofit organizations and foundations involved in agricultural research, sustainable agricultural research, education, and extension;

"(11) two members representing consumer and environmental interests;

"(12) one member representing private sector organizations involved in development programs and issues in developing countries; and

"(13) one member representing agencies of the Department of Agriculture that do not have research capabilities.

"(c) CHAIRPERSON; VICE-CHAIRPERSON.—The Advisory Board shall select a chairperson and vice-chairperson from its membership at its first meeting each year, who shall serve in those positions for a term of 1 year.

"(d) MEETINGS.—The Advisory Board shall meet a sufficient number of times each year to carry out subsection (f). At least one meeting per year shall be a combined meeting with the Joint Council and with other representatives of Federal agencies that support agricultural research.

"(e) PANELS.—The Advisory Board may establish such panels as the Advisory Board considers appropriate to develop information, reports, advice, and recommendations for the use of the Advisory Board in meeting the responsibilities of the Advisory Board. Members of such panels may include members of the Advisory Board, Advisory Board staff members, individuals from the Department of Agriculture and other departments and agencies of the Federal Government, and individuals from the private sector who have expertise in the subject to be examined by the panel.

"(f) RESPONSIBILITIES.—

"(1) GENERAL.—The Advisory Board shall have general responsibility for preparing independent advisory opinions on the food and agricultural sciences. One member of the Advisory Board shall be elected annually to serve as liaison to the Joint Council.

"(2) SPECIFIC.—The Advisory Board shall have specific responsibility for—

"(A) reviewing the policies, plans, and goals of programs within the Department of Agriculture involving the food and agricultural sciences, and related programs in other Federal and State departments and agencies and in the colleges and universities developed by the Secretary under this Act;

"(B) reviewing and assessing the extent of agricultural research, teaching, and extension being conducted by the private sector and the relationships and coordination of such activities with federally supported agricultural research, teaching, and extension programs;

"(C) reviewing and providing consultation to the Secretary on national policies, priorities and strategies for agricultural research and extension for both the short and long term;

"(D) assessing the overall adequacy of, and making recommendations to the Secretary, Federal agencies, and private organizations who are contributing to agricultural research, extension, and education funding, with regard to the distribution of resources and the allocation of funds authorized by this Act;

"(E) identifying emerging agricultural research, teaching, and extension issues and suggesting programs and technology transfer solutions for use by the public and private agricultural science and education community;

"(F) evaluating the results and the effectiveness of research and extension programs as to their influence on long-term goals of agriculture expressed in section 1403A and consumer needs;

"(G) not later than July 1 of each year, providing an oral briefing to the Secretary (by the chairperson of the Advisory Board), and a written report of recommendations to Congress and the Secretary, concerning the allocation of responsibilities and levels of funding among federally supported agricultural research and extension programs, including—

"(i) a review and assessment of the allocation of funds for agricultural research and extension made for the preceding fiscal year by organizations represented by the members on the Joint Council;

"(ii) an evaluation of—

"(I) the effectiveness of coordination of Federal and private research initiatives;

"(II) new research and extension programs that need to be conducted by the research system; and

"(III) an evaluation of the effectiveness of the private and public research and extension system; and

"(iii) minority views, if timely submitted; and

"(H) not later than February 20 of each year, submitting a report containing—

"(i) an appraisal by the Advisory Board of the proposed budget of the President for the food and agricultural sciences for the fiscal year beginning in such year;

"(ii) the recommendations of the Secretary contained in the annual report submitted by the Secretary pursuant to section 1410; and

"(iii) separate views of members of the Advisory Board, if timely submitted,

to the President, the Committees on Agriculture and Appropriations of the House of Representatives, the Committees on Agriculture, Nutrition and Forestry and Appropriations of the Senate, and the Joint Council.

"(3) REPORTS.—Each report of the Advisory Board shall list the membership of the Board, including the organizational and employment affiliation of each Board member.

"(g) REPORT BY SECRETARY.—Not later than February 1 of each year, the Secretary shall submit a report to Congress that describes the manner in which the recommendations of the Advisory Board have been incorporated into the budget and programs of the Department of Agriculture.

"(h) SUPPORT.—

"(1) SECRETARY.—Except as provided in paragraph (2), the Secretary shall provide such support and staffing for the Advisory Board as is necessary to carry out this section.

"(2) PRIVATE SOURCES.—Notwithstanding section 1342 of title 31, United States Code, the Advisory Board may accept voluntary and uncompensated services, and private funds, to carry out this section.".

SEC. 202. JOINT COUNCIL ON FOOD AND AGRICULTURAL SCIENCES.

Section 1407 (7 U.S.C. 3122) is amended to read as follows:

"SEC. 1407. JOINT COUNCIL ON FOOD AND AGRICULTURAL SCIENCES.

"(a) ESTABLISHMENT.—The Secretary shall establish within the Department of Agriculture a committee to be known as the Joint Council on Food and Agricultural Sciences which shall have a term that expires September 30, 1995.

"(b) MEMBERSHIP.—The Joint Council shall be composed of 18 members representing organizations or agencies that conduct or assist in conducting programs of research, extension, or teaching in the food and agricultural sciences (including State cooperative institutions, other colleges and universities having a demonstrable capacity to carry out food and agricultural research, extension, or teaching, agencies within the Department of Agriculture and other Federal agencies that have significant research, extension, or teaching responsibilities), including—

"(1) a representative of the National Institutes of Health;

"(2) a representative of the National Science Foundation;

"(3) a representative of the Department of Energy;

"(4) a representative of the Environmental Protection Agency;

"(5) the Director of the Agricultural Research Service;

"(6) the Director of the Cooperative State Research Service;

"(7) the Director of the Extension Service;

"(8) the Director of the Economic Research Service;

"(9) the Director of the Forest Service;

"(10) the Director of the National Agricultural Library;

"(11) the Assistant Secretary for Economics;

"(12) the Assistant Secretary for Science and Education;

"(13) the Chairman of the Experiment Station Committee on Policy established by land grant colleges;

"(14) the Chairman of the Extension Committee on Policy established by land grant colleges;

"(15) the Chairman of the Resident Instruction Committee on Policy established by land grant colleges;

"(16) the Chairman of the International Committee on Policy established by land grant colleges;

"(17) a representative of colleges eligible to receive funds under the Act of August 30, 1890 (26 Stat. 419, chapter 841; 7 U.S.C. 321 et seq.); and

"(18) the Chairman of the American Association of Schools and Colleges of Agriculture and Renewable Resources (AASCARR).

"(c) CHAIRPERSON.—The Joint Council shall be chaired by the Assistant Secretary for Science and Education.

"(d) TECHNICAL PANELS.—

"(1) ESTABLISHMENT.—The Joint Council may establish such technical panels as the Joint Council considers necessary to prioritize and accomplish research and technology transfer in accordance with this section.

"(2) DUTIES.—A panel shall—

"(A) define research and technology transfer needs;

"(B) delineate alternatives and recommend research and technology transfer approaches;

"(C) identify centers of expertise; and

"(D) make recommendations regarding the overall level and mix of available funding.

"(3) EXPERTISE.—Members of the panels shall include expertise from the public and private sector on all dimensions of a priority area, including its basic science, applied research, education, economic, and social dimensions.

"(e) LIASON TO ADVISORY BOARD.—One member of the Joint Council shall be elected annually to serve as liaison to the Advisory Board.

"(f) MEETINGS.—The Joint Council shall meet at least once during each 3-month period. At least one meeting each year shall be a combined meeting with the Advisory Board and with other representatives of Federal agencies that support agricultural research.

"(g) RESPONSIBILITIES.—

"(1) PRIMARY.—The primary responsibility of the Joint Council shall be to bring about more effective research, extension, and teaching in the food and agricultural sciences in the United States by improving planning and coordination of publicly and privately supported food and agricultural science activities and by relating Federal budget development and management program management to the activities.

"(2) ADDITIONAL.—The Joint Council shall—

"(A) provide a forum for the interchange of information among the organizations represented by the members of the Joint Council that will ensure improved awareness among the organizations concerning the agricultural research, extension, and teaching programs, results, and directions of each organization;

"(B) analyze and evaluate the economic, environmental, and social impacts of agricultural research extension and teaching program conducted in the United States and determine high priority agricultural research areas with particular potential to advance the purposes expressed in section 1403A and submit annual reports identifying such high priority research areas to the Secretary and representatives of Federal agencies that support agricultural research;

"(C) develop and review the effectiveness of the system, for use by the Secretary and representatives of Federal agencies that support agricultural research, of compiling, maintaining, and disseminating information concerning—

"(i) federally supported agricultural research or extension projects; and

"(ii) to the maximum extent possible, private agricultural research and extension projects conducted by colleges and universities, foundations, contract research groups, business and others, except that information on private agricultural research and extension projects shall not be included in the system unless they are partially or entirely funded by the Federal Government or the organizations sponsoring the projects agree to the inclusion of information about such projects;

"(D) assist the parties in developing, reviewing, and evaluating memoranda of understanding or other documents that detail the terms and conditions between the Secretary and the participants in agricultural research, extension, and teaching programs under this Act and other Acts;

"(E) assist the Secretary and representatives of other Federal agencies that support agricultural research in carrying out the responsibilities assigned to the Secretary and the representatives of other Federal agencies that support agricultural research under this Act through planning and coordination in the food and agricultural sciences by—

"(i) using, wherever possible, the existing regional research, extension, and teaching organizations of State cooperative institutions to provide regional planning and coordination; and

"(ii) the development of recommendations and reports describing current and long-range needs, priorities, and goals in the food and agricultural sciences and means to achieve the goals;

"(F) on recommendations from the Advisory Board—

"(i) oversee and prioritize funds made available under Federal law for agricultural research, extension and teaching to promote the purposes of section 1403A and this section;

"(ii) provide an annual review and prioritize requests for agricultural related special research and construction grants;

"(iii) provide an annual review of the competitive grants made by the Secretary to determine priority research and grant categories and types which best advance the purposes expressed in section 1403A; and

"(iv) review and make budget recommendations on the research, extension, and teaching budgets for the Agricultural Research Service, the Forest Service, the Economic Research Service, the Extension Service, the National Agriculture Library, and the Cooperative State Research Service, except that the Joint Council may not make budget recommendations with respect to formulas that are used to allocate funds under—

"(I) the Act of March 2, 1887 (24 Stat. 440, chapter 314; 7 U.S.C. 361a et seq.) (commonly known as the 'Hatch Act of 1887'); or

"(II) the Act of May 8, 1914 (38 Stat. 372, chapter 79; 7 U.S.C. 341 et seq.) (commonly known as the 'Smith-Lever Act');

"(G) submit a report—

"(i) not later than June 30 of each year, specifying—

"(I) the recommendations of the Joint Council on priorities for food and agricultural research, extension, and teaching programs;

"(II) suggested areas of responsibility among Federal, State, and private organizations in carrying out such programs; and

"(III) the levels of financial and other support needed to carry out such programs;

"(ii) not later than November 30 of each year, specifying—

"(I) ongoing research, extension, and teaching programs;

"(II) accomplishments of such programs; and

"(III) the levels of financial and other support needed to carry out such programs;

"(iii) not later than June 30, 1993, outlining a 5-year plan for food and agricultural sciences that reflects the coordinated views of the research, extension, and teaching community, and updating the plan every 2 years thereafter,

with each such report submitted to Congress, the Secretary, and the directors of Federal agencies who are supporting agricultural research, and with minority views, if timely submitted; and

"(H) coordinate with the Secretary in assessing the current status of, and developing a plan for, the effective transfer of new technologies to the farming community.

"(h) PUBLICITY OF MEETINGS AND ACTIVITIES.—The meetings of the Joint Council shall be publicly announced in advance and shall be open to the public. Appropriate records of the activities of the Joint Council shall be kept and made available to the public on request.

"(i) NONAPPLICABILITY OF OTHER FEDERAL PROVISIONS.—The Federal Advisory Committee Act (5 U.S.C. App. 2) and title XVIII of the Food and Agriculture Act of 1977 (7 U.S.C. 2281 et seq.) shall not apply to the Joint Council.".

SEC. 203. AGRICULTURAL SCIENCE AND TECHNOLOGY REVIEW BOARD.

Subtitle B (7 U.S.C. 3121 et seq.) is amended by adding at the end the following new section:

"SEC. 1413B. AGRICULTURAL SCIENCE AND TECHNOLOGY REVIEW BOARD.

"(a) ESTABLISHMENT.—The Secretary, acting through the Joint Council, shall establish and oversee an Agricultural Science Technology Review Board (hereinafter in this section referred to as the 'Board').

"(b) MEMBERSHIP.—

"(1) COMPOSITION.—The Board shall be composed of 11 individuals, appointed by the Secretary, who have expertise in technology assessment, environmental sciences, rural sociology, international agricultural issues, the social sciences, agricultural sciences (both basic and applied), technology transfer, and education, including representatives of—

"(A) the Agricultural Research Service;

"(B) the Cooperative State Research Service;

"(C) the Extension Service;

"(D) private foundations and nonprofit organizations who have expertise in agricultural research, education, and technology transfer; and

"(E) private agricultural research and technology transfer firms.

"(2) PUBLIC RECOMMENDATIONS.—The Secretary shall appoint members of the Board based on recommendations of the public, in a manner determined by the Secretary.

"(3) PRIVATE SECTOR REPRESENTATION.—A majority of the members of the Board appointed under paragraph (1) shall be from the private sector.

"(4) TERMS.—Members of the Board shall serve for staggered terms of 3 years, as determined by the Secretary.

"(5) CHAIRPERSON.—The Board shall select a chairperson from its membership, who shall serve in that position for a term of 1 year.

"(6) SUPPORT.—The Secretary shall provide such support for the Board as is necessary to carry out this section.

"(b) TECHNICAL INTERPRETATION AND ASSESSMENTS.—

"(1) IN GENERAL.—The Board shall—

"(A) provide technical interpretation and translation of current and emerging agricultural and environmental science issues for use by the

Joint Council and the Advisory Board in setting priorities and conducting evaluations; and

"(B) provide technology assessment of current and emerging public and private agricultural research and technology transfer initiatives, including emerging technologies from private industry and public institutions that would influence agriculture, environment, nutrition, and the broad social, economic, and health consequences on urban and rural communities.

"(2) PETITIONERS.—Any person or organization (including the Advisory Board and the Joint Council) may petition the Secretary to conduct an assessment or review of any agricultural research or extension project or program that is being conducted by the public or private sector.

"(3) PRIVATE SECTOR ANALYSES.—The Board may conduct an assessment of private sector agricultural research and technology transfer initiatives involving a private sector entity only to the extent the entity is willing to cooperate in the assessment.

"(c) TECHNOLOGY ASSESSMENT REPORT.—

"(1) IN GENERAL.—Not later than December 31 of each year, the Board shall prepare a report that contains a technology assessment of emerging public and private agricultural research initiatives and activities, including—

"(A) recommendations on how such research would be best directed to advance the goals and purposes set forth in section 1403A; and

"(B) an assessment of activities conducted by the Joint Council, the Secretary, research components of public and private colleges and universities, and emerging private agricultural research initiatives.

"(2) RECIPIENTS.—The Board shall submit the report required under paragraph (1) to Congress, to the Secretary, to the heads of other Federal agencies who support agricultural research, and (on request) to private organizations who have a significant involvement in agricultural research.

"(3) MINORITY VIEWS.—The Board shall include minority views in the report, if timely submitted.".

SEC. 204. NATIONAL CLEARINGHOUSE ON AGRICULTURAL SCIENTIFIC TALENT.

Subtitle B (7 U.S.C. 3121 et seq.) (as amended by section 203 of this Act) is further amended by adding at the end the following new section:

"SEC. 1413C. NATIONAL CLEARINGHOUSE ON AGRICULTURAL SCIENTIFIC TALENT.

"(a) ESTABLISHMENT.—The Secretary, with assistance from the Joint Council, shall establish and oversee a National Clearinghouse on Agricultural Scientific Talent.

"(b) DUTIES.—The Clearinghouse shall—

"(1) collect, identify, and disseminate information on public and private sector agricultural scientific expertise, and the location of major centers of research and technology transfer expertise; and

"(2) identify and disseminate information on sources of agricultural research and technology transfer funding.

"(c) LOCATION.—The Clearinghouse shall be located at the National Agricultural Library located in Beltsville, Maryland.

"(d) FUNDING.—

"(1) FEDERAL.—Subject to paragraph (2), the Secretary and the heads of other Federal agencies involved in support of agricultural research shall provide such funds as are necessary to carry out this section.

"(2) PRIVATE.—The Secretary may solicit and accept funds to carry out this section from private organizations who are involved in agricultural research.".

TITLE III—AGRICULTURAL RESEARCH AND EXTENSION FUNDING PROGRAMS

SEC. 301. COMPETITIVE GRANTS FOR AGRICULTURAL, FOOD, AND ENVIRONMENTAL RESEARCH.

Section 2(b) of the Act entitled "An Act to facilitate the work of the Department of Agriculture, and for other purposes", approved August 4, 1965 (7 U.S.C. 450i(b)), is amended

(1) by inserting "(1)" after the subsection designation; and

(1) by striking the third sentence and all that follows and inserting the following new paragraphs:

"(2) For purposes of this subsection, the term 'high priority research' means basic and applied research that focuses on both national and regional research needs (and methods to transfer such research to onfarm or inmarket practice) in—

"(A) plant systems, including plant genome structure and function; molecular and cellular genetics and plant biotechnology; plant-pest interactions and biocontrol systems; crop plant response to environmental stresses; unproved nutrient qualities of plant products; and new food and industrial uses of plant products;

"(B) animal systems, including acquaculture, cellular and molecular basis of animal reproduction, growth, disease, and health; identification of genes responsible for improved production traits and resistance to disease; improved nutritional performance of animals; and improved nutrient qualities of animal products;

"(C) nutrition, food quality, and health, including microbial contaminants and pesticides residues related to human health; links between diet and health; bioavailability of nutrients; postharvest physiology and practices; and improved processing technologies;

"(D) natural resources and the environment, including fundamental structures and functions of ecosystems; biological and physical bases of sustainable production systems; minimizing soil and water losses and sustaining surface water and ground water quality; global climate effects on agriculture; forestry; and biological diversity;

"(E) engineering, products, and processes, including new uses and new products from traditional crops, animals, byproducts, and natural resources; robotics, energy efficiency, computing, and expert systems; new hazard and risk assessment and mitigation measures; and water quality and management; and

"(F) markets, trade, and policy, including optional strategies for entering and being competitive in overseas markets; new decision tools for onfarm and inmarket systems; choices and applications of technology; technology assessment; and new approaches to economic development and viability in the rural United States and developing nations.

"(3) In addition to making research grants under paragraph (1), the Secretary may conduct a program to improve research capabilities in the agricultural, food, and environmental sciences and award the following categories of competitive grants:

"(A) Grants may be awarded to a single investigator or coinvestagtors within the same discipline.

"(B) Grants may be awarded to teams of researchers from different areas of agricultural research and scientific disciplines.

"(C) Grants may be awarded to mutidisciplinary teams that are proposing research on long-term applied research problems, with technology transfer a major component of all such grant proposals.

"(D) Grants may be awarded to an institution to allow for the improvement of the research, development, technology transfer, and education capacity of the institution through the acquisition of special research equipment and the improvement of agricultural education and teaching. The Secretary shall use not less than 25 percent, and not more than 40 percent, of the funds made available for grants under this subparagraph to provide fellowships to outstanding pre- and post-doctoral students for research in the agricultural sciences.

"(E) Grants may be awarded to single investigators or coinivestgators who are beginning their research careers and do not have an extensive research publication record. To be eligible for a grant under this subparagraph, an individual shall have less than 5 years of post-graduate research experience.

"(F) Grants may be awarded to ensure that the faculty of small and mid-sized institutions who have not previously been successful in obtaining competitive grants under this subsection receive a portion of the grants.

"(4) The term of a competitive grant made under this subsection shall not exceed 5 years.

"(5)(A) To the extent applicable, the Federal Advisory Committee Act (5 U.S.C. App. 2), and regulations issued by the Secretary to carry out this subsection, shall govern the establishment and operation of peer review groups.

"(B) In seeking proposals for grants under this subsection and in performing peer and advisory review evaluations of such proposals, the Secretary shall seek the widest participation of qualified scientists in the Federal Government, colleges and universities, State agricultural experiment stations, and the private sector.

"(C) All proposals shall undergo review by a panel of experts who have demonstrated scientific expertise in the scientific category in which the proposal was submitted.

"(D) The panels shall evaluate the scientific and technical merit of grant proposals and make budget recommendations for each proposal but no final funding decisions.

"(E) A second level of review shall be conducted by an advisory review panel that shall be made up of a group of lay and scientific representatives of the agricultural community.

"(F) The primary function of the advisory review panel shall be to evaluate the proposal on the basis of meeting the broad priorities in agricultural research, extension, and higher education set forth in section 1403A of the National Agricultural Research, Extension, and Teaching Policy Act of 1977, as established by the Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board, along with potential societal impact that the research may have.

"(G) The panel shall make final recommendations on funding.

"(H) The advisory panel shall be made up of an equal number of personnel who have expertise in the agricultural sciences, and members of the general public who are leaders in fields of agricultural public policy, social sciences, and technology assessment.

"(6)(A) All proposals submitted for competitive grants under this subsection shall contain an evaluation that addresses the potential benefits of the research in meeting the goals and priorities set forth in section 1403A of the National Agricultural Research, Extension, and Teaching Policy Act of 1977, as established by the Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board.

"(B) A technology assessment shall be included for proposals with research goals that have the potential to influence farm scale implementation, rural communities, farm ownership, and environmental management of farm practices. Assistance in the preparation of the assessment may be provided by qualified individuals in the land grant university system or by private consultants who have expertise in the social sciences and technology assessment.

"(7) A grant made under paragraph (1) may not be used for the planning, repair, rehabilitation, acquisition, or construction of a building or facility.

"(8) The Secretary may not take the offer or availability of matching funds into consideration in making a grant under this subsection.

"(9) In consultation with the National Agricultural Research and Extension Users Advisory Board and an advisory review board established under paragraph (5)(E), the Joint Council on Food and Agricultural Sciences shall review research programs, grant types, and funding allocation levels of the competitive grant system and recommend to the Secretary modifications in program.

"(10) There are authorized to be appropriated to carry out this subsection $300,000,000 for each fiscal year, of which each fiscal year—

"(A) not less than 30 percent shall be available to make grants under subparagraph (C) of paragraph (3) for research to be conducted by multidisciplinary teams who are conducting mission-linked systems research;

"(B) not less than 10 percent shall be available to make grants under subparagraphs (D) and (F) of paragraph (3) for awarding grants in research and education strengthening and research opportunity; and

"(C) not more than 4 percent may be retained by the Secretary to pay administrative costs incurred by the Secretary in carrying out this subsection.".

SEC. 302. SENSE OF CONGRESS REGARDING FORMULA FUNDING FOR AGRICULTURAL RESEARCH AND EXTENSION.

It is the sense of Congress that—

(1) any increase in the amount of funds made available for the program of competitive grants established by section 2(b) of the Act entitled "An Act to facilitate the work of the Department of Agriculture, and for other purposes", approved August 4, 1965 (7 U.S.C. 450i(b)), should not be derived from a reduction in funds for formula funding programs established under—

(A) the Act of March 2, 1887 (24 Stat. 440, chapter 314; 7 U.S.C. 361a et seq.) (commonly known as the "Hatch Act of 1887"); or

(B) the Act of May 8, 1914 (38 Stat. 372, chapter 79; 7 U.S.C. 341 et seq.) (commonly known as the "Smith-Lever Act"); and

(2) programs that are funded under such Acts should be funded at a level that will maintain an effective infrastructure to conduct applied agricultural research and technology transfer programs.

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II

101ST CONGRESS
2D SESSION

S. 2334

To expand the United States Department of Agriculture's low input sustainable agriculture research and education programs, and to provide biotechnology risk assessment research, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MARCH 26 (legislative day, JANUARY 23), 1990

Mr. LEAHY (for himself, Mr. DASCHLE, Mr. HARKIN, and Mr. KOHL) introduced the following bill; which was read twice and referred to the Committee on Agriculture, Nutrition, and Forestry

---

A BILL

To expand the United States Department of Agriculture's low input sustainable agriculture research and education programs, and to provide biotechnology risk assessment research, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Sustainable Agriculture Research and Education Act of 1990".

SEC. 2. TABLE OF CONTENTS.

The table of contents is as follows:

Sec. 1. Short Title.
Sec. 2. Table of Contents.

TITLE I—LOW-INPUT SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION PROGRAM

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Sec. 106. Technical Guides for Low-Input Agricultural Production Systems.
Sec. 107. Reports.
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TITLE II—NATIONAL TRAINING PROGRAM IN SUSTAINABLE AGRICULTURE

Sec. 201. Findings and Purposes.
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Sec. 301. Findings and Purposes.
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Sec. 401. Findings and Purposes.
Sec. 402. Definitions.
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TITLE V—HERBICIDE RESISTANCE RESEARCH

Sec. 501. Findings and Purposes.
Sec. 502. Definitions.
Sec. 503. Prohibition of Assistance for Certain Research.
Sec. 504. Reallocation of Research Funding.
Sec. 505. Report.

TITLE I—LOW-INPUT SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION PROGRAM

SEC. 101. FINDINGS AND PURPOSES.

(a) FINDINGS.—Congress finds that—

(1) the United States must focus its research and education efforts on the development of sustainable methods of farming that are productive and profitable, conserve natural resources, and protect the environment and the health and safety of agricultural workers and consumers;

(2) different methods of agricultural production can contribute to the goal of achieving long-term sustainability including alternative, regenerative, biological, organic, ecological, and low-input sustainable agricultural production methods;

(3) many farmers and ranchers are highly dependent on nonrenewable production inputs and natural resources for agricultural production and are seeking information on sustainable production systems;

(4) farmers and ranchers have demonstrated interest in participating directly in research and extension efforts and that participation can improve farming methods and benefit research and extension programs; and

(5) expanded agricultural research and extension efforts are needed to assist farmers and ranchers to—

(A) improve agricultural productivity, profitability and competitiveness;

(B) prevent water pollution and soil erosion and degradation;

(C) protect the health and safety of farmers, farmworkers, and consumers;

(D) implement soil, water, and energy conservation practices;

(E) reduce the use of nonrenewable production inputs, to the maximum extent feasible and practicable, and optimize the use of on-farm resources;

(F) explore alternative livestock production systems that lead to low-input livestock production; and

(G) stabilize and improve farm income through crop and enterprise diversification.

(b) PURPOSES.—It is the purpose of this title to encourage research designed to increase our knowledge concerning agricultural production systems that—

(1) maintain and enhance the quality and productivity of the soil;

(2) conserve soil, water, energy, and natural resources, and improve fish and wildlife habitat conditions;

(3) prevent contamination of surface and ground water;

(4) protect the health and safety of farmers, farmworkers and consumers;

(5) promote the humane treatment of animals;

(6) increase the number of economically viable self-employment opportunities in agriculture.

SEC. 102. DEFINITIONS.

As used in this title:

(1) EXTENSION.—The term "extension" shall have the same meaning given to such term by section 1404(7) of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3103(7)).

(2) NON-PROFIT ORGANIZATION.—The term "non-profit organization" means an organization, group, institute, or institution that—

(A) has a demonstrated capacity to conduct agricultural research or education programs;

(B) has experience in research, demonstration, education, or extension in sustainable agricultural practices and systems; and

(C) qualifies as a not-for-profit organization under section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)(3)).

(3) SECRETARY.—The term "Secretary" means the Secretary of the United States Department of Agriculture.

(4) STATE.—The term "State" means each of the fifty States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, the Virgin Islands of the United States, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands.

(5) STATE AGRICULTURAL EXPERIMENT STATIONS.—The term "State agricultural experiment stations" shall have the same meaning given to such term by section 1404(13) of the National Agricultural Research, Extension, and Teaching Act of 1977 (7 U.S.C. 3103(13)).

SEC. 103. RESEARCH AND EXTENSION PROJECTS.

(a) IN GENERAL.—The Secretary shall conduct research and extension projects to obtain data, develop conclusions, demonstrate technologies, and conduct educational programs that promote the purposes of this title, including research and extension projects that—

(1) facilitate and increase scientific investigation and education in order to—

(A) reduce, to the maximum extent feasible and practicable, the use of toxic chemical pesticides and fertilizers in agricultural production;

(B) improve low-input farm management in order to enhance agricultural productivity, profitability, and competitiveness;

(C) promote crop, livestock, and enterprise diversification; and

(2) facilitate the conduct of research and extension projects in order to—

(A) study, to the maximum extent practicable, agricultural production systems that are located in areas that possess various soil, climate, and physical characteristics;

(B) study farms that have been, and will continue to be, managed using farm production practices that rely on a low-input and other conservation practices;

(C) take advantage of the experience and expertise of farmers and ranchers through their direct participation and leadership in projects; and

(D) transfer practical, reliable and timely information to farmers and ranchers concerning sustainable farming practices and systems.

(b) AGREEMENTS.—The Secretary shall carry out this section through agreements entered into with land-grant colleges or universities, other universities, State agricultural experiment stations, the Cooperative State Extension Service, nonprofit organizations, or Federal or State governmental entities.

(c) SELECTION OF PROJECTS.—

(1) IN GENERAL.—The Secretary shall select research and extension projects under this section on the basis of—

(A) the recommendations of the National Sustainable Agriculture Advisory Council established in section 104 of this title;

(B) the relevance of the project to the purposes of this title;

(C) the appropriatness of the design of the project;

(D) the likelihood of obtaining the objectives of the project; and

(E) the national or regional applicability of the findings and outcomes of the proposed project.

(2) PRIORITY.—The Secretary shall give priority to projects that—

(A) are recommended by the National Sustainable Agriculture Advisory Council;

(B) closely coordinate research and extension activities;

(C) indicate how the findings of the project will be made readily usable by farmers;

(D) maximize the involvement and cooperation of farmers, including projects involving on-farm research and demonstration;

(E) involve a multidisciplinary systems approach; and

(F) involve cooperation between farms, nonprofit organizations, colleges and universities, and government agencies.

(d) DIVERSIFICATION OF RESEARCH.—The Secretary shall conduct projects and studies under this section in areas that are broadly representative of the diversity of United States agricultural production, including production on small farms, mixed-crop livestock farms and diary operations.

(e) ON-FARM RESEARCH.—The Secretary may conduct projects and activities that involve on-farm research and demonstration in carrying out this section.

(f) IMPACT STUDIES.—The Secretary may approve study projects concerning the national and regional economic, social and environmental implications of the adoption of sustainable agricultural practices and systems.

(g) PROJECT DURATION.—

(1) IN GENERAL.—The Secretary may approve projects conducted under the title that have a duration of more than one fiscal year.

(2) SEQUENCE PLANTING.—In the case of a research project conducted under this section that involves the planting of a sequence of crops or crop rotations, the Secretary shall approve such project for a term that is appropriate to the sequence or rotation being studied.

(h) PUBLIC ACCESS.—The Secretary shall ensure that research projects are open for public observation at specified times.

(i) INDEMNIFICATION.—

(1) IN GENERAL.—Subject to paragraph (2), the Secretary may indemnify the operator of a project conducted under this section for damage incurred or undue losses sustained as a result of rigid requirement of research or demonstration under such project that is not experienced in normal farming operations.

(2) SUBJECT TO AGREEMENT.—An indemnity payment under paragraph (1) shall be subject to any agreement between a project grantee and operator entered into prior to the initiation of such project.

SEC. 104. PROGRAM ADMINISTRATION.

(a) DUTIES OF SECRETARY.—The Secretary shall—

(1) administer the programs and projects under sections 103 and 105 through the Cooperative State Research Service in close cooperation with the Extension Service and other appropriate agencies;

(2) establish a National Sustainable Advisory Council in accordance with paragraph (b);

(3) establish a minimum of four Regional Administrative Councils in accordance with paragraph (c); and

(4) in conjunction with such Regional Administrative Councils, identify regional host institutions required to carry out the provisions of such programs or projects.

(b) NATIONAL SUSTAINABLE AGRICULTURE ADVISORY COUNCIL.—

(1) MEMBERSHIP.—The membership of the National Sustainable Agriculture Advisory Council shall include representatives of—

(A) the Agricultural Research Service;

(B) the Cooperative State Research Service;

(C) the Soil Conservation Service;

(D) the Extension Service;

(E) State cooperative extension services;

(F) State agricultural experiment stations;

(G) the Economic Research Service;

(H) the National Agricultural Library;

(I) the Environmental Protection Agency;

(J) the Board of Agriculture of the National Academy of Sciences;

(K) private nonprofit organizations;

(L) farmers utilizing sustainable agriculture systems and practices;

(M) the Geological Survey;

(N) agribusiness; and

(O) other specialists in agricultural research and technology transfer.

(2) RESPONSIBILITIES.—The National Sustainable Agriculture Advisory Council shall—

(A) make recommendations to the Secretary concerning research and extension projects that should receive funding under sections 103 and 105;

(B) promote the programs established under this title at the national level;

(C) coordinate research and extension activities funded by such programs;

(D) establish general procedures for awarding and administering funds under this title;

(E) consider recommendations for improving such program;

(F) facilitate cooperation and integration between sustainable agriculture, national water quality, integrated pest management, food safety, and other related programs; and

(G) prepare and submit an annual report concerning its activities to the Secretary.

(c) REGIONAL ADMINISTRATIVE COUNCILS.—

(1) MEMBERSHIP.—The membership of the Regional Administrative Councils shall include representatives of—

(A) the Cooperative State Research Service;

(B) the Extension Service;

(C) State cooperative extension services;

(D) State agricultural experiment stations;

(E) the Soil Conservation Service;

(F) State departments engaged in promoting sustainable agriculture;

(G) nonprofit organizations;

(H) farmers utilizing sustainable agriculture systems and practices;

(I) the Geological Survey; and

(J) other persons knowledgeable about sustainable agriculture and its impact on the environment and rural communities.

(2) RESPONSIBILITIES.—The Regional Administrative Councils shall—

(A) make recommendations to the National Sustainable Agriculture Advisory Council concerning research and extension projects that should receive funding under sections 103 and 105;

(B) promote the programs established under this title at the regional level;

(C) establish goals and criteria for the selection of projects authorized under this title within the applicable region;

(D) appoint a technical committee to evaluate the proposals for projects to be considered under this title by such council;

(E) review and act on the recommendations of the technical committee, and coordinate its activities with the regional host institution; and

(F) prepare and make available an annual report concerning projects funded under sections 103 and 105, together with an evaluation of the project activity.

(d) CONFLICT OF INTEREST.—Members of the council and the committees shall recuse themselves from participation in discussions and recommendations of proposed projects if members have or have had a professional or business interest in, including the provision of consultancy services, the organization whose grant application is under review.

SEC. 105. FEDERAL-STATE MATCHING GRANT PROGRAM.

(a) ESTABLISHMENT.—The Secretary shall establish a Federal-State matching grant program to make grants to States to encourage and assist in the creation or enhancement of State sustainable agriculture research, extension, and education programs.

(b) ELIGIBLE PROGRAMS AND ACTIVITIES.—State programs eligible to receive a grant under this section may conduct a variety of activities designed to carry out the purposes of this title, including—

(1) activities that encourage the incorporation and integration of sustainable agriculture concerns in all State research, extension, and education projects;

(2) educational programs for farmers, educators, and the public;

(3) activities that encourage revisions to agricultural curricula to promote understanding of sustainable agriculture at all levels;

(4) the establishment of sustainable agriculture undergraduate and graduate degree programs;

(5) the development and funding of innovative sustainable agriculture research, extension, and education programs;

(6) the conduct of research and demonstration projects;

(7) the provision of technical assistance to farmers and ranchers;

(8) activities that encourage farmer-to-farmer information exchanges; and

(9) such other activities that are appropriate to the agricultural concerns of the State and are consistent with the purposes of this title.

(c) SUBMISSION OF PLAN.—

(1) IN GENERAL.—States that elect to apply for a grant under this section shall prepare and submit, to the appropriate Regional Administrative Council established under section 104, a State plan and schedule for approval by such Council and the Secretary.

(2) CONTENTS OF STATE PLAN.—State plans prepared under paragraph (1) shall provide details of the proposed program to be implemented using funds provided under this section for fiscal years 1991 through 1995, or any five-year period thereafter, and shall identify the sources of matching State funds for the same fiscal years.

(3) PARTICIPATION.—To be eligible for approval, State plans submitted under this subsection shall demonstrate that there will be extensive and direct participation of farmers in the development, implementation, and evaluation of the program.

(d) GRANT AWARD.—

(1) AMOUNT OF GRANT.—Subject to paragraph (2), the Secretary shall provide grants to eligible States in an amount not to exceed 50 per centum of the cost of the establishment or enhancement of a State sustainable agriculture program under a plan approved by the Secretary under subsection (c) for a period of not to exceed five years.

(2) STATE PARTICIPATION.—To be eligible to receive a grant under this section, a State shall agree to pay, from State appropriated funds, other State revenue, or from private contributions received by the State, not less than 50 per centum of the cost of the establishment or enhancement of the sustainable agriculture program under an approved plan under subsection (c).

SEC. 106. TECHNICAL GUIDES FOR LOW-INPUT AGRICULTURAL PRODUCTION SYSTEMS.

(a) ESTABLISHMENT.—The Secretary shall, not later than three hundred and sixty-five days after the date of enactment of this Act, with full public notice and comment, and in consultation with the National Sustainable Advisory Council established under section 104, develop technical guides describing farm production systems that foster low-input sustainable agricultural production systems, mitigate public health risks, protect environmental quality, conserve soil, water, and energy, and otherwise carry out the purposes of this title.

(b) COORDINATION OF EFFORT.—To the extent possible, the Secretary shall coordinate the ongoing technical guide work of the Soil Conservation Service and the Extension Service in order to avoid duplication of effort and to provide farmers and other agriculture professionals with a comprehensive technical guide that addresses a broad array of technical concerns.

(c) CONTENT OF TECHNICAL GUIDES.—

(1) IN GENERAL.—The technical guides developed under this section shall include detailed information on selection of crops and crop-plant varieties, rotation practices, tillage systems, nutrient management systems, soil building practices, pest, weed, and disease management, soil, water, and energy conservation, livestock management, and other practices useful in carrying out the purposes of this title.

(2) STANDARDS AND INSTRUCTIONS.—Such guides shall provide standards and practical instructions, based on existing scientific and technical knowledge, to ensure nondegradation of farmland soils, protection of water supplies from depletion and contamination, and reductions in the use of nonrenewable resources and purchased production inputs to the lowest practical levels.

(3) INFORMATION COLLECTION.—To assist in the development of such guides, the Secretary shall—

(A) survey existing data bases containing information on sustainable agricultural systems, including those created by the Soil Conservation Service and the National Agricultural Library and the Appropriate Technology Transfer in Rural Areas program established under section 2(b)(7) of the Act entitled "An Act to facilitate the work of the Department of Agriculture, and for other purposes", approved August 4, 1965 (7 U.S.C. 450i(b)(7));

(B) inventory and classify by subject matter studies, reports, and other material developed by any person or governmental agency with the participation or financial assistance of the Secretary, that could be used to promote the purposes of this title;

(C) identify, assess, and classify existing information and research reports and projects that will further the purposes of this title, including information and research relating to—

(i) the development of environmentally sound cropping, livestock, tillage, nutrient management, pest management, water quality and conservation, and alternative energy systems;

(ii) the social, economic, and environmental effects of alternative production systems and technologies; and

(iii) the role of public policies and programs in fostering or hindering the purposes of this subtitle; and

(D) determine which of such reports and projects provide useful information and make such useful reports available to farmers and ranchers.

(d) GRANT PROGRAM.—The Secretary, in consultation with the National Sustainable Agriculture Advisory Council established in section 104, may establish a grant program to assist in the development and periodic revision of technical guides under this section.

(e) DISTRIBUTION OF GUIDES.—The Secretary shall ensure that the technical guides developed under this section are made available to the public.

SEC. 107. REPORTS.

The Secretary shall, not later than April 1, 1991, and each April 1 thereafter, prepare and submit, to the Committee on Agriculture of the House of Representatives, the Committee on Agriculture, Nutrition, and Forestry of the Senate, and the National Sustainable Agriculture Advisory Council—

(1) a report describing the results of the programs carried out under sections 103 and 105; and

(2) a report describing the progress of projects conducted under this title, including—

(A) a summary and analysis of data collected under such projects;

(B) recommendations based on such data for new basic or applied research; and

(C) the number, length, and type of projects proposed, funded and carried out, by region.

SEC. 108. AUTHORIZATION FOR APPROPRIATIONS.

There are authorized to be appropriated $40,000,000 for each fiscal year to carry out this title. Of any amount that is appropriated to carry out the programs established under this title, no less than $15,000,000, or no less than two thirds of any appropriation, whichever is greater, shall be used to carry out sections 103 and 104.

TITLE II—NATIONAL TRAINING PROGRAM IN SUSTAINABLE AGRICULTURE

SEC. 201. FINDINGS AND PURPOSES.

(a) The Congress finds that—

(1) there is a great need for research-based practical knowledge that will assist farmers and nonfarmers adopt sustainable agriculture technologies, practices, and systems on their farms, in their businesses and in their homes;

(2) farmers rely upon the Extension Service as a primary source for the dissemination of research-based practical knowledge concerning farming methods; and

(3) Extension Service as well as other agricultural leaders need training a new sustainable agriculture technologies and practices in order to provide the information farmers and nonfarmers demand.

(b) PURPOSE.—It is the purpose of this title to establish a training program in sustainable aagriculture for Extension Service agents and other leaders in agricultural education in order to facilitate the extension of knowledge of sustainable agriculture.

SEC. 202. DEFINITIONS.

As used in this title:

(1) EXTENSION SERVICE.—The term "Extension Service" shall include employees of the Federal Extension Service, and the State and county Cooperative Extension Services.

(2) SUSTAINABLE AGRICULTURE.—The term "sustainable agriculture" means a variety of farming systems, ranging from organic systems that use no synthetic chemical inputs to those involving the prudent use of pesticides or antibiotics, and which result in—

(A) thorough incorporation of natural processes such as nutrient cycles, nitrogen fixation, and pest-predator relationships into the agricultural production process;

(B) reduction in the use of off-farm inputs with potential to harm the environment or the health of farmers and consumers;

(C) greater productive use of the biological and genetic potential of plant and animal species;

(D) improvement of the match between cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of current production levels; and

(E) profitable and efficient agricultural production, with emphasis on improved farm management and conservation of soil, water, energy, and biological resources.

SEC. 203. PROGRAM ADMINISTRATION.

(a) IN GENERAL.—The Secretary shall establish a National Training Program in Sustainable Agriculture to provide education and training for Extension Agents and other professionals involved in education and transfer of technical information concerning sustainable agriculture in order to develop understanding, competence, and ability to teach and communicate the concepts of sustainable agriculture to Extension Agents and to farmers and urban residents needing information on sustainable agriculture systems.

(b) ADMINISTRATION.—The training program shall be organized and administered jointly by the Centers established in section 204 and the Extension Service and shall include onsite education at the Centers as well as education at other locations including land-grant universities, experiment stations, and demonstration farms.

SEC. 204. NATIONAL TRAINING CENTERS.

(a) IN GENERAL.—The Secretary shall designate not less than two national training centers to coordinate and administer education in sustainable agriculture as provided for in section 203.

(b) TRAINING PROGRAM.—The Centers shall offer intensive instruction programs and involving classroom and field training work for extension specialists and other individuals who are required to transmit technical information.

(c) PROHIBITION ON CONSTRUCTION.—The Centers established in paragraph (a) shall be located at existing facilities. No funds appropriated under this title shall be used for facility construction.

(d) ADMINISTRATION.—Centers should be administered by organizations that—

(1) have a specific mandate relating to sustainable agriculture;

(2) have a base of programming that includes both research and education related to sustainable agriculture, with an emphasis on the application of an overall production systems approach which studies environmental interactions, farming methods, and resource efficiency; and

(3) have cooperative relationships with other agencies such as the Agricultural Research Service, the Cooperative Extension Service, land grant universities and non-profit organizations.

(e) COORDINATION OF RESOURCES.—The Centers shall make use of information generated by the United States Department of Agriculture and the State agriculture experiment stations, and the practical experience of farmers, especially those cooperating in on-farm demonstrations and research projects.

(f) LOCATION.—The Secretary should consider utilizing existing organizations with expertise in sustainable agriculture to assist in the design and implementation of the training program.

SEC. 205. COMPETITIVE GRANTS.

(a) IN GENERAL.—The Secretary shall establish a competitive grant program to award grants to organizations, including land grant universities, in order to carry out sustainable training for county agents and other individuals needing basic information on sustainable agriculture practices.

(b) SHORT COURSES.—The purpose of the grants shall be to establish in the regions, training programs that consist of workshops and short courses designed to familiarize participants with the concepts and importance of sustainable agriculture.

SEC. 206. TRAINING PROGRAM PARTICIPANTS.

(a) IN GENERAL.—The Secretary should attempt to train all Extension Service personnel and other individuals who advise farmers in sustainable agricultural production methods.

(b) EXTENSION SERVICE.—The Secretary shall require that not less than 20 per centum of Federal Extension Service staff participate in the intensive instruction at the Centers by September 30, 1995. In addition, the Secretary shall ensure that—

(1) each State Cooperative Extension Service designates not less than 50 per centum of such State's specialists and agents to attend the intensive instruction program offered at the Centers by September 30, 1995; and

(2) each State Cooperative Extension Service designates not less than 20 per centum of such State's nonspecialists to attend the short courses established through competitive grants by September 30, 1995.

SEC. 207. AUTHORIZATION OF APPROPRIATIONS.

There are to be authorized to be appropriated $10,000,000 for each fiscal year to carry out the provisions of this title.

TITLE III—EXTENSION SERVICE PESTICIDE APPLICATION ADVICE

SEC. 301. FINDINGS AND PURPOSES.

(a) FINDING.—The Congress finds that, in many cases, Extension Service agents would like to provide information to farmers concerning lower, effective rates of pesticide application than that specified on the label of the pesticide, in order to guide farmers toward low-input sustainable agriculture systems.

(b) PURPOSE.—The purpose of this title is to authorize Extension Service agents to provide information to farmers on reduced pesticide application rates when and if such information is available.

SEC. 302. DEFINITIONS.

As used in this title:

(1) EXTENSION SERVICE.—The term "Extension Service" shall include employees of the Federal Extension Service, and the State and county Cooperative Extension Services.

(2) PESTICIDE.—The term "pesticide" means any sustance which alone, in chemical combination, or in any formulation with one or more substances, is defined as a pesticide in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.).

SEC. 303. PESTICIDE USE RECOMMENDATIONS.

(a) IN GENERAL.—Notwithstanding any other provision of law, Extension Service agents may advise farmers to apply any pesticide at a dosage, concentration, or frequency that is less than that specified on the label for such pesticide if the Extension Service agent has reason to believe that use of the pesticide at the lower dosage, concentration, or frequency would be efficacious.

(b) PUBLICATIONS.—Extension Service agents may include advice to farmers concerning such lower usage of specific pesticides in publications issued by the Extension Service if—

(1) such publication also states the rates of application specified on the label of such pesticide; and

(2) such publication discusses the efficacy of the pesticide when applied at such lower rate.

(c) ADDITIONAL INFORMATION.—Any Extension Service publication that contains directions for the use of specific pesticides only at the dosage, concentration, or frequency specified on the label shall also include the statement "Information may be available from your Extension Service regarding the efficacy of using lower pesticide rates.".

SEC. 304. CONFORMING AMENDMENT.

Subsection (ee) of section 2 of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136) is amended by striking "unless the labeling specifically prohibits deviation from the specified dosage, concentration or frequency".

TITLE IV—BIOTECHNOLOGY RISK ASSESSMENT RESEARCH

SEC. 401. FINDINGS AND PURPOSES.

(a) FINDINGS.—Congress finds that—

(1) rapid advances in the application of biotechnology to agriculture have and will continue to result in the development of products whose research, evalua-

tion, and commercial use require introduction into the environment; and

(2) more scientific information about the effects of the introduction of genetically engineered organisms into the environment, and the development of methods to contain and monitor such introduction are needed to—

(A) help researchers make sound judgments about the overall environmental impacts of genetically engineered organisms they develop, and to design projects that minimize any risks associated with the introduction of such genetically engineered organisms; and

(B) help regulators make scientifically sound and timely decisions regarding the introduction of genetically engineered organisms.

(b) PURPOSES.—It is the purpose of this title to—

(1) authorize and support environmental assessment research to the extent necessary to help address general concerns about environmental effects of biotechnology; and

(2) authorize research to help regulators develop policies, as soon as is practicable, concerning the introduction into the environment of such technology.

SEC. 402. DEFINITIONS.

As used in this title:

(1) ENVIRONMENTAL ASSESSMENT RESEARCH.—The term "environmental assessment research" is research aimed at understanding the potential impacts on agricultural ecosystems, natural ecosystems, and human health of genetically engineered organisms introduced into the environment.

(2) GENETICALLY ENGINEERED ORGANISM.—The term "genetically engineered organism" is a living organism, including a virus, that is genetically modified using techniques of modern biotechnology, including recombinant DNA, chemical and electrical poration, and microinjection.

SEC. 403. GRANT PROGRAM.

(a) IN GENERAL.—The Secretary shall establish a grant program within the Cooperative State Research Service and the Agricultural Research Service to provide the necessary funding for environmental assessment research concerning the introduction of genetically engineered organisms into the environment.

(b) AREAS OF RESEARCH.—Areas of research eligible for funding shall include—

(1) the development of methods of physically and biologically contain genetically engineered fish, plants,

and microorganisms once they are introduced into the environment;

(2) the development of methods to monitor the dispersal of genetically engineered fish, plants, and microorganisms;

(3) research designed to further existing knowledge with respect to the rates and methods of gene transfer that may occur between genetically engineered organisms and related wild and agricultural organisms; and

(4) other areas of research designed to further the purposes of this title.

(c) REQUESTS FOR PROPOSALS.—The Secretary shall consult with the Administrator of the Animal and Plant Health Inspection Service, any existing Office of Agricultural Biotechnology, and any existing Agricultural Biotechnology Research Advisory Committee regarding any specific areas of research considered for funding under this section.

(d) PROGRAM COORDINATION.—The Secretary shall coordinate research authorized under this title with the Office of Research and Development of the Environmental Protection Agency and shall seek to avoid duplication of research activities.

(e) OPEN COMPETITION.—Grants shall be made on the basis of quality of the proposed research project and shall not be restricted to land grant colleges and colleges of agriculture.

SEC. 404. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated for each fiscal year such sums as are necessary to carry out this title.

TITLE V—HERBICIDE RESISTANCE RESEARCH

SEC. 501. FINDINGS AND PURPOSES.

(a) FINDINGS.—Congress finds that—

(1) private and public sector researchers are currently engaged in considerable research to genetically modify plants to increase the herbicide resistance of such plants;

(2) the use of chemical herbicides may contribute to environmental pollution;

(3) our scarce public resources must, to the extent possible, be dedicated to research aimed at lessening the use of chemical pesticides; and

(4) the private sector will continue to develop herbicide resistant plants.

(b) PURPOSE.—It is the purpose of this title to transfer federal financial assistance now being used to assist individuals or entities in applied research designed to develop herbicide resistant plants to other weed management control options, including plant genome research.

SEC 502. DEFINITIONS.

As used in this title:

(1) HERBICIDE RESISTANT PLANTS.—The term "herbicide resistant plants" means plants that are modified using recombinant methods or any other methods to improve the metabolic capabilities of plants to resist a particular synthetic chemical herbicide.

(2) PESTICIDE.—The term "pesticide" means any substance which alone, in chemical combination, or in any formulation with one or more substances, is defined as a pesticide in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.).

(3) SECRETARY.—The term "Secretary" means the Secretary of the United States Department of Agriculture.

SEC. 503. PROHIBITION OF ASSISTANCE FOR CERTAIN RESEARCH.

(a) IN GENERAL.—Notwithstanding any other provision of law, the Secretary shall not allow any funds provided under the National Agricultural, Research, Extension, and Teaching Policy Act of 1977, the Food Security Act of 1985, or any other Act to be provided to any individual or entity for the purpose of conducting applied research designed to develop herbicide resistant plants.

(b) EXEMPTION.—Subsection (a) shall not apply to risk assessment and monitoring research authorized under title IV of this Act.

(c) PROJECT COMPLETION.—

(1) COMPLETION OF RESEARCH PROJECTS UNDERWAY.—Except as provided in paragraph (2) the Secretary may permit completion of applied research projects designed to develop herbicide resistant plants if such projects are significantly underway and are near completion at the time of enactment of this Act.

(2) TERMINATION OF FUNDING.—No funding for any projects under paragraph (1) shall be provided after September 30, 1992.

SEC. 504. REALLOCATION OF RESEARCH FUNDING.

To the extent practicable, the Secreary shall allocate Federal funding equal to the amount of Federal funds previously dedicated to research on the development of herbicide resistant plants prior to enactment of this Act for research on plant genomes that is directed at the development of plants adapted to week control management systems with reduced reliance on chemical herbicides, including row crop varieties better adapted to mechanical weed control, cover crops, and rotational crops which enhance weed control, and pest resistant plants.

SEC. 505. REPORT.

(a) In general.—The Secretary of Agriculture shall conduct a survey of land-grant universities and colleges, 1890 institutions, and the Tuskegee Institute to determine the extent to which the private sector is supporting applied research at such institutions designated to develop herbicide resistant plants.

(b) Report.—Not later than September 30, 1991, the Secretary shall prepare and submit to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate a report containing the findings of the survey conducted under subsection (a).

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